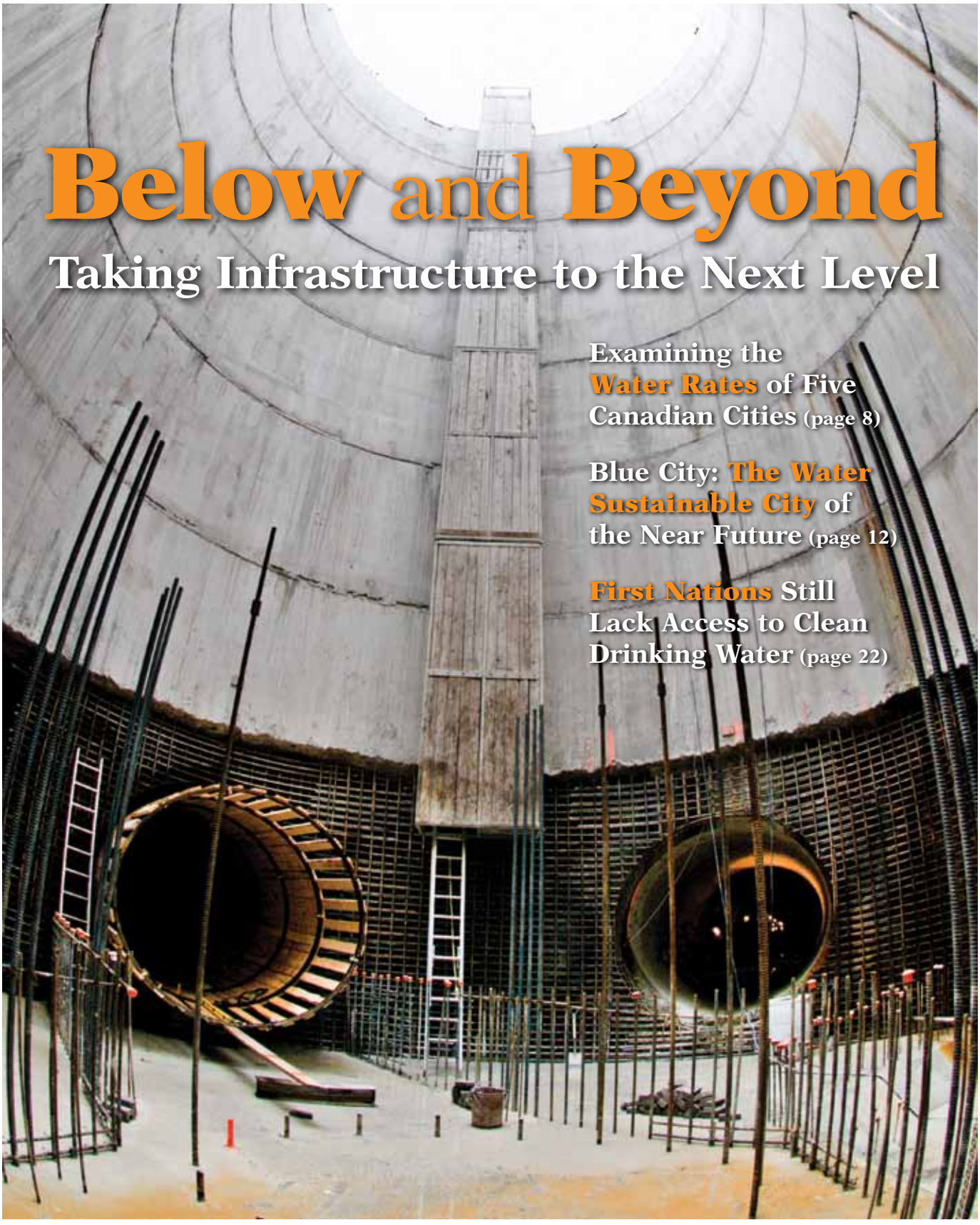
THE COMPLETE WATER MAGAZINE

MARCH/APRIL 2014

# WATER CANADA



# Below and Beyond

## Taking Infrastructure to the Next Level

Examining the **Water Rates** of Five Canadian Cities (page 8)

Blue City: **The Water Sustainable City** of the Near Future (page 12)

**First Nations** Still Lack Access to Clean Drinking Water (page 22)

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VOLUME 14 NUMBER 2

WATERCANADA
THE COMPLETE WATER MAGAZINE



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Successful cities will be those that manage their water efficiently.
— ANNA JEANETTE LARNELIUS, CIVILS REGIONAL HEAD, WSP SWEDEN

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# The Nexus in Crisis

## California's drought is everybody's problem.

BY KERRY FREEK

**DANGEROUSLY LOW RIVER LEVELS** might be a gold prospector's dream, but California's drought—gearing up to be the worst in the United States on record this century—is quickly becoming a widespread nightmare.

At the end of January, the National Oceanic and Atmospheric Administration reported that water levels in all but a few reservoirs in the state were at less than 50 per cent of capacity. By February, drought had affected every square inch of the state in some capacity, and the U.S. federal government announced that nearly 15 per cent of the state, and much of the farmland, is experiencing extreme conditions. On February 19, the Chicago Tribune reported that 10 communities were at acute risk of running out of drinking water in 60 days.

This extreme drought is leading to extreme measures.

California's farmers, who receive nearly 80 per cent of the state's water allocations, are facing significant cutbacks—and, in some cases, they're losing water delivery completely. In February, Central Valley farmers learned the state's largest delivery system would provide no water to the area, which produces half of the fruits, nuts, and vegetables in the United States. The California Farm Water Coalition says this means farmers will leave 500,000 acres of land unplanted in the 2014 season.

You can guess what that might mean for the country. "California is our biggest agricultural producer, so what happens here matters to every working American, right down to the cost of food that you put on your table," said U.S. President Obama in an address in the same month.

Canadians will feel the impact, too. University of Guelph economics professor Sylvain Charlebois told CTV News the price of food products imported from California could soon increase by as much as 20 per cent.

Beyond just feeling the impact, Canadians also have an active role to play in mitigating the effects of this disaster—especially when it comes to energy. According to the U.S. Energy Information Administration, almost 14 per cent of the nation's hydroelectric generating capacity is concentrated in California. Lower river levels hinder the state's ability to produce energy. While natural gas can make up much of the difference, the drought increases demand for this resource in a time when much of the United States and Canada is (or, by the time you read this note, was) in a deep freeze.

The unprecedented demand for natural gas has impacted fuel supplies, driving the price of the resource skyward. During this time of crisis, Californians are being asked to conserve both water and energy.

That's just the beginning for California. The effects of the drought will be lasting, especially in the farming sector where many people have lost their livelihoods. Both state and federal governments are directing emergency drought relief funds—$687 million and $200 million, respectively—to help California residents, farm workers, and communities deal with water shortages.

When we talk about water and its influence, the links between it and food, energy, and the economy—call it any kind of nexus, if you prefer—become dangerously apparent. Californians, and now the rest of North America, are learning that lesson the hard way.

The urgent challenge is to move those lessons to policy and action. After significant weather events, drought and flood alike, a country's economy takes a major hit. Follow the money and, on top of the millions of dollars for aid, these events result in higher prices for things like food, energy, and insurance, not to mention the increased threat to environmental and human health and safety.

Will this finally be the crisis that spurs us to action? Perhaps now is the time to look at—and actually begin implementing—alternative sources of power, including sewage heat recovery (*see page 20*). We must apply what we've learned to ensure this crisis doesn't worsen or persist. We must be open to learning from this and other disasters—and ensure our systems are resilient enough to handle what Mother Nature throws our way. WC

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**PG 22**

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**PG 26**

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**PG 32**

## ABOUT THE COVER

A look up the main storage shaft of the West Don Lands outfall and stormwater quality facility prior to the assembly of the precast weir tower. This issue, we explore water and wastewater infrastructure in Canada.

Credit: David Crowder, R.V. Anderson Associates Limited

## NEXT ISSUE: MAY/JUNE

- **Real Time Data in the Water Industry**
- **Putting Water on Page One: The Media's Portrayal of Water**
- **Yukon's Peel Watershed: What's the Fuss?**

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## FRONT

A didymo bloom, which is known to resemble nasal discharge, in Quebec's Duval River.

Credit: Michel Chouinard

# Hot Rock Snot

**CONTRARY TO** what's been previously believed, "rock snot" algae blooms—*Didymosphenia geminate*, or "didymo" for short—are not invasive species in Canadian waters. New research shows the blooms, which are noted for having a slimy consistency that feels like wet wool and for an appearance that looks like nasal discharge, have been present in the Gaspesie region of Quebec since at least the 1970s. Global climate change in the form of rising regional air temperatures and longer growing seasons might be the reason for the recent increase in abundance of didymo in Gaspesie rivers since 2006. In the past, anglers have exclusively been blamed for introducing the species from other watersheds.

Michelle Lavery, whose master's thesis at Queen University's produced these new findings, said, "The conditions created by climate change mean that there is less accumulation of snow and ice in the winter. This means there is not as big a rush when the snow and ice melts in the spring. The flow is not huge and evens out, and didymo favours more stable flows."

Lavery said a huge rush of flow from snowmelt would move the river bed and disturb the didymo, which produces thick mats on hard surfaces and can survive for several years in that form. "The blooms are allowed to build and grow without that surge of snowmelt," she added.

Excessive and persistent didymo blooms have been observed throughout North America at an increasing rate for the past 20 years. In 2013, the Duval River, a tributary of the Bonaventure River, experienced the most severe didymo bloom ever recorded in Eastern Canada. These blooms were comparable to extreme blooms observed over the past decade in New Zealand, where didymo is recognized as an invasive species. Other Canadian provinces where didymo blooms have been identified as a concern include British Columbia and Alberta.

—Staff with files from Paleoecological Environmental Assessment and Research Laboratory


Credit: Jay Shanahan

# Ring the Alarm

**MAJOR STRUCTURAL PROBLEMS** may lead to the collapse of a water tower in Miramichi, New Brunswick, according to a report prepared for the city's department of public works. The report outlines the poor condition of the water tower on Williston Road, which was constructed in 1990. There are visible water stains on the tower that indicate where there is seeping water.

"It for sure is an alarm," Jay Shanahan, the city's director of public works, told the CBC. "It […] probably got moved up higher on the priority list sooner than we would have liked, but it is part of operations. We do have things that are unpredictable and it just gets out of our control."

In an interview with Water Canada, Shanahan added, "This is a major part of infrastructure for our water system and very easy for everyone to see. All municipalities experience similar issues, but most problems are underground and not visible to the public and never seem to get the same attention."

Residents who live close to the tower are both anxious and eager for the tower to be fixed. One resident, Thelbert Savoy, told the CBC he hopes the repairs or replacement of the tower will improve the quality of his "undrinkable" water. "People are pretty annoyed about it. Take a hot shower and you can smell the chlorine right in the lines," he said.

Since the release of the report, the Miramichi city council agreed that repairs to the water tower will be a top priority with an estimated cost of $1.2 million. Shanahan said the city is hoping to have a replacement online in late October 2014. —Staff

## Soundbite

"What's needed is for people to recognize the true cost and the economic and environmental impact of having infrastructure that is working well and protecting the environment. No development can happen if you don't have the proper infrastructure to provide clean, safe, affordable tap water, and if you don't have the infrastructure to deal with wastewater and stormwater."

**James Campbell,** Halifax Water spokesperson, in an interview for *Taking a Hike* on page 8.

## Online at WATERCANADA.NET


Credit: Andy Curtis

**BLOG:** In part three of Alberta WaterSMART's "Rewilding Our Rivers" blog series, **Lauren Eden** explores how the province's riparian zones could play a beneficial role in flood mitigation. ***bit.ly/ABrivers***

**VIDEO: Mike Paterson**, senior fellow and associate at the International Institute for Sustainable Development (IISD), discusses the Experimental Lakes Area facility, the types of experiments that have taken place there, and its future. ***bit.ly/ELAvideo***


Credit: Cambium Environmental and Infiltrator Systems

**BLOG: Kevin Warner** goes in-depth on how small systems helped the Village of Omemee, Ontario solve its wastewater woes—and at a minimal cost. ***bit.ly/omemeewater***

Canadian cities tackle infrastructure and costs in their water rates.

If a pipe bursts underground, does it still show up on your bill? Thanks in part to inattention and years of relatively cheap water rates, municipal water utilities are facing burgeoning costs associated with improving and maintaining infrastructure. **Saul Chernos** looks at how five utilities are trying to achieve long-term, equitable financing strategies.

# Taking a Hike

# Halifax


Credits: City of Halifax

**WHEN HALIFAX WATER** took over the Halifax Regional Municipality's wastewater and stormwater services in 2007, they were underfunded and in poor condition. Rates didn't even come close to covering the full cost of maintaining and upgrading the newly acquired infrastructure. However, a 30-year plan, with $2.6 billion in projected investments, stands to fix more than a few leaky pipes.

That's a lot of money for a mid-size utility and municipality, but the Nova Scotia Utility and Review Board has approved rate hikes that have seen the average household water bill jump from $607 to $683 annually, a $76 increase over three years.

Halifax Water spokesperson James Campbell says the regulator expects the utility to achieve full-cost recovery and asset management for all three services. "We're not allowed to operate in a deficit, by regulation, but we have been, and we need to replace that deteriorating infrastructure and start recovering the full cost. The only way to do that is through the rates."

Having recognized that sudden, sharp rate increases can put pressure on the region's most vulnerable citizens, Halifax Water launched the $H_2O$-Help To Others Water Assistance Fund in 2011 to offer subsidies to low-income households. The Salvation Army administers $H_2O$, which offers customers up to $200 over a 24-month period.

"We thought it a prudent thing to put into place," Campbell says. "These are necessary services, but there's a cost to operating, and some folks who are on the margins would have a hard time absorbing some of these increases."

# Toronto


Credits: City of Toronto

**WHEN TORONTO** city council approved the 2014 budget in December, it marked the ninth year in a row that water rates climbed by nine per cent.

Commitment by city politicians to a 10-year plan to generate capital for asset renewal and management has helped engineer the reversal of a backlog cost that peaked at $1.8 billion. It is now down to $1.6 billion.

"We put that plan in front of council saying we needed to raise rates to get there, and we needed time to get our capital delivery mechanisms going," Toronto Water general manager Lou Di Gironimo says, describing a phased-in approach. Once unable to keep up with the rate of infrastructure deterioration, Di Gironimo says the city has shifted focus, spending more money every year on replacement.

Work includes more than $5 billion to address aging infrastructure, plus an additional $1.7 billion to restore streams and alleviate chronic combined sewer overflows and basement flooding through the ongoing, multi-year Wet Weather Flow Master Plan.

Toronto Water has proceeded thus far while remaining debt-free. The utility even offers a 30 per cent discount to seniors and low-income earners, and large-volume industrial users can access that same discount if they incorporate water efficiency measures while meeting sewer bylaws.

However, as Toronto Water continues to work toward full-cost accounting, the city is considering options like rate increases, debenture financing, and adapting the rate structure to trigger a separate, identifiable charge for stormwater services.

The question, Di Gironimo says, boils down to one fundamental point: "How fast do we want to make progress?"

# Calgary

Credits: City of Calgary

**RATES IN THE CITY OF CALGARY** are designed with asset management and full-cost recovery in mind.

"We're heading into a four-year business planning and budget cycle, from 2015 to 2018, and that provides an opportunity to review and prepare our rate and ensure we're looking at financial sustainability, customer fairness and equity, and management of our natural resource," says Kathy Davies Murphy, manager of strategic services with the city's water resources department.

She points out the city is younger than its Canadian counterparts, so its infrastructure is in relatively good shape. Still, maintenance is needed and the city is growing, and prices for electricity and natural gas to operate water plants and other facilities have been rising. So Calgary turns to water bills, levies for new development, and other sources beyond the municipal tax base to recoup costs.

"We conduct regular cost-of-service studies on our infrastructure and services to evaluate our revenue needs and ensure our rates are fair and equitable," Davies Murphy says. "And we follow a user-pay philosophy. A customer's monthly utility bill reflects the services they've received for water and wastewater. The more you use, the more you pay."

Stormwater is in the mix too—reflected in a flat fee for every customer.

And while Calgary does not offer subsidies, it is close to having all residential properties metered. "Only a small segment of customers pay our flat rate," Davies Murphy says. "A metered account means customers have numerous opportunities to implement water conservation measures and they can reduce their bills through their own behaviour."

# Montreal

Credits: City of Montreal

**THE CITY OF MONTREAL** stands apart from most Canadian municipalities in that residents pay for water, wastewater, and stormwater services through property taxes. The city doesn't offer subsidies, and metered rates apply only in a few boroughs.

Hervé Logé, who heads the city's sustainable water management division, says any decision to harmonize the system rests with local politicians. However, with local elections held this past fall, many of them are just coming to grips with the fact the department has an accumulated maintenance deficit of $1.6 billion and infrastructure that's aging and decaying.

Annual revenue increases of about nine per cent are needed, he says. Yet, in the 2014 budget ratified in January, councillors cut water department expenditures by about $27.7 million.

Logé is quick to point out that water-related services are more than just what flows from the tap. He estimates variable costs represent just 10 per cent of department costs. The rest is fixed-cost infrastructure to give access to water services.

"The business of water management is not so much a business of cubic-metre delivery, but really a business of reliability and capacity," he says.

To illustrate his point, Logé points to office towers. They're low-volume water users—kitchens and toilets, mainly. But if their occupants hope to have any kind of meaningful fire protection, especially on the upper floors, they're absolutely dependent on reliable pipes and other equipment designed to handle the required demand.

"The question the politicians need to figure out," Logé says, "is how we distribute these costs among stakeholders."

Credits: Yellowknife

# Yellowknife

**THE CITY OF YELLOWKNIFE** has a population of approximately 18,000 and a water-wastewater infrastructure deficit of roughly $50 million.

One big-ticket item, underway since the 1980s, has been replacing legacy corrugated metal sewer pipes with ductile iron. "It was supposed to be a 10-year program, but the more we uncovered, the bigger the program got," says Chris Greencorn, director of public works and engineering.

The city accelerated the work in 2012, doubling the cost to $5 million annually, and Greencorn anticipates completion in five years.

The city is also building a new water treatment plant to meet new federal drinking water standards implemented by the territorial government. At $28 million, it's not included in the infrastructure deficit.

Costs for these projects are largely borne through water bills, general revenues, and gas tax funding.

There are no subsidies, but residents can tap into the city's Service Connection Failure Assistance Fund. For a $10 monthly levy and a $1,000 deductible, they're covered if a pipe bursts on their property.

While most buildings are connected to municipal infrastructure, some outlying areas rely on trucked service, with water delivered and sewage removed twice weekly. "It would be cost prohibitive to get pipes out there," Greencorn says.

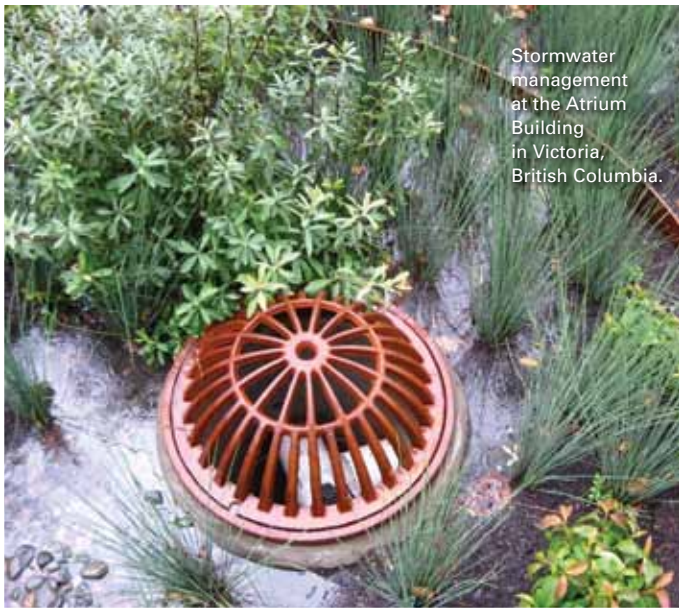
Still, rates remain uniform. "It costs more to run trucked water, but we believe it doesn't matter where you live in Yellowknife—people should pay the same rate."

So what happens when the big-ticket items are completed? As with other communities, even the newer infrastructure is beginning to show its age.

"It's an ongoing problem," Greencorn says. "But after five years, it will be preventative maintenance instead of reactive maintenance." WC

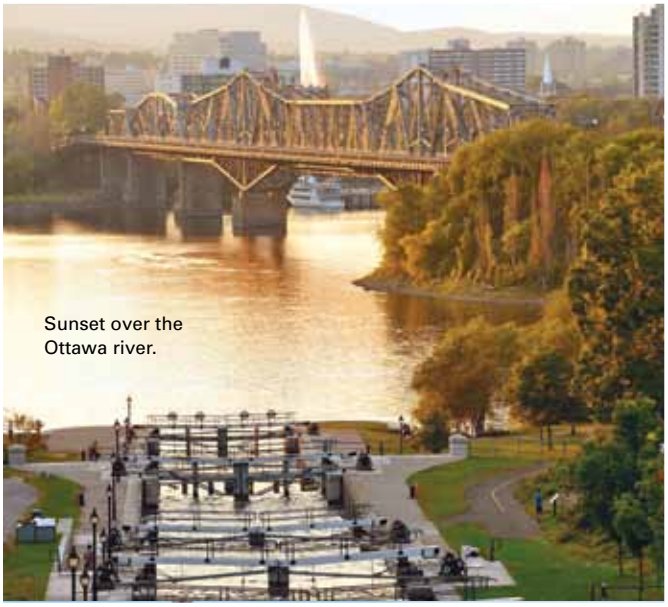
Saul Chernos is a Toronto-based writer and frequent Water Canada contributor.

Water is visible in the Blue City.



Stormwater management at the Atrium Building in Victoria, British Columbia.

Credit: Murdoch de Greef Inc.



Sunset over the Ottawa river.

Oxygen aeration of wastewater in sewage treatment plant.

# Blue City

## What does the water sustainable city of the future look like?

BY KIRK STINCHCOMBE, LOUISE BRENNAN, AND JENN WILLOUGHBY

**A RECENT** Canadian report questioned 17 experts about their vision of a water sustainable city: what such a city would look and feel like, emerging innovations in the water sector, the financial, institutional, and technological barriers to progress, and their personal wish lists. Together, they imagined the possibilities in urban water sustainability.

Interviewed in 2013, the experts came from diverse backgrounds, including a landscape architect, a lawyer, the head of one of Canada's largest water utilities, the lead of a regional non-governmental organization, a financier, a professor of engineering, a consultant specializing in asset management, an IT specialist, and many more.

The resulting report, Blue City: The Water Sustainable City of the Near Future, was released in January 2014 and weaves ideas into a single story of a hypothetical—but realizable—city. The exemplary elements of the Blue City are not only within reach for most communities, but are actually occurring in real places across Canada and around the world.

Embedded in the phrase **Water Sustainable City of the Near Future** are four concepts:

- By **city** we mean a municipal environment of any size. We tend to think specifically of Canadian cities, but many of the insights would apply anywhere.
- By **sustainable**, we mean the capacity to endure. This includes biological systems that remain diverse and productive over time. It also implies the potential for long-term maintenance of human well-being. We think broadly and include ecological, community, and financial aspects.
- By **water**, we mean drinking water, stormwater and wastewater. We think of water quality, quantity, and availability.
- By **near future**, we think along variable time frames. Some aspects of water sustainability are attainable within as few as five years. Changes that are more difficult could take perhaps 20 years to realize. Still others, such as replacement of major infrastructure, may take more time.

Blue City represents an end state toward which municipalities can aspire.

Blue City was produced to help practitioners and decision makers build a business case for more sustainable, integrated water management. Since Blue City is largely an amalgamation of various aspects of real cities, it is easy to imagine its physical attributes, social relationships, and cultural norms. In fact, the report is punctuated by case studies embracing progressive ideas for urban water sustainability.

"There has long been a need for this kind of report: simple enough for someone with a general interest in water management to understand, sophisticated enough for the specialist to benefit," says David Brooks, an independent water advisor and one of our collaborators.

Blue City offers a vision of a place where water is visible and valued, recognized as integral to the community's economic, social, and environmental well-being. Scott Murdoch, landscape architect with Victoria-based Murdoch de Greeff Inc., captures the essence of this vision when he suggests, "We need cities where natural processes are visible. Water is a really great thing to see around us. It's dynamic and changing."

Another hallmark of Blue City is that it calls citizens to embrace and promote a culture of conservation that extends beyond water to energy and all natural resources. There is a shared responsibility for resource stewardship, and citizens are encouraged to become involved and participate in making their home municipalities livable.

Collectively, our collaborators identified four strategic areas where progress toward sustainability could be made:

- financial responsibility;
- progressive regulation and utility governance;
- customer-oriented information; and
- cutting-edge technology.

The innovations we need are practical and possible. Examples range from making instantaneous consumption data available to customers, to developing performance-based regulations, to recovering nutrients from wastewater, to creating new models for capital financing.

The concepts described within each of the four strategic areas are rooted in

## Eight Blue City Case Studies

**BLUE CITY** is an attainable place. Many of its exemplary characteristics are found in real cities across Canada and around the world. The full report contains eight case studies that describe various aspects of a water sustainable urban environment.

**1 Building Design (City of Victoria, British Columbia)**
The Atrium Building is a seven-storey, 204,000-square-foot retail and office building at the edge of downtown Victoria. It is a multi-award winning project with acclaimed stormwater innovations.

**2 Water in Decision-Making (Okotoks, Alberta)**
Okotoks is a town of 24,511, located just south of Calgary. The town has an innovative relationship between bylaws and incentive programs to encourage continuous improvements in water conservation.

**3 Blue Built Program (Guelph, Ontario)**
The City of Guelph administers a certification program that provides rebates for new homes that meet an approved set of water-efficient standards, ranging from faucet aerators to rainwater harvesting systems.

**4 Conservation-Oriented Pricing (Seattle)**
Seattle Public Utilities has charged rates based on volume for decades and has been fully metered since 1920. In 1989, it was among the first in North America to introduce seasonal surcharges.

**5 Developer Incentives (Chicago)**
The Green Permit Program offers progressive developers an expedited permitting process and other incentives in exchange for incorporating items from a "Green Menu" of strategies and technologies in their projects.

**6 Performance-Based Regulation (Edmonton, Alberta)**
Since 2002, the City of Edmonton and EPCOR Water Services have operated according to performance-based regulations, a mechanism that prevents overspending, defines expectations, and lays out penalties in the case of under performance.

**7 Utility Performance Measurement (Halifax, Nova Scotia)**
Halifax Water is the first regulated water, wastewater, and stormwater utility in Canada. Its pressure and leakage management program has resulted in annual savings in operating costs of $600,000.

**8 Source Substitution (Australia)**
Pimpama-Coomera is a large greenfield development located on the Gold Coast in Queensland, Australia. It has a dedicated Class A+ recycled water treatment plant and entirely separate pipe system to supply homes and businesses in the area with water suitable for toilet flushing and garden irrigation.

practice and emerging trends. Our collaborators pointed us toward tangible examples. As Carl Yates, general manager of Halifax Water points out, "When developing an integrated and sustainable approach to water management, the first thing you have to look at is governance. Utility operations should be based on sound business principles with performance and financial practices regulated by an independent agency to ensure transparency and accountability."

To build the city, we as practitioners need to offer a compelling business case. The pitch will look different in every circumstance, as each place has its unique social and hydrological context. However, embracing long time frames and the local political context are paramount to gaining support for an innovative project.

Creating processes that are inclusive of a diversity of opinions around water management will arguably be the most challenging part of building a water sustainable city. Success will inevitably require effective change management—dedicated leadership, risk management, and celebrated achievements. Theresa McClenaghan, executive director and counsel with the Canadian Environmental Law Association, says, "Whole sectors can change when you get a couple of good champions and good examples. Things can shift once there are a few pathfinders."

Blue City offers a vision of a place where water is visible and valued, recognized as integral to the community's economic, social, and environmental well-being.

Glen Daigger, senior vice president and chief technology officer at CH2M Hill and president of the International Water Association, adds, "Change requires motivation, which is an emotion. This is where the report really excels—by painting a vivid picture of what a water sensitive urban area is, and the individual and collective actions required to achieve it."

Blue City is an accessible report, grounded in rigorous research and analysis, but presented in the style of a magazine. Complete with practical tips, this piece will lead practitioners and decision makers alike into a water sustainable near future.

The project was funded by the Blue Economy Initiative, a national project founded by the Canadian Water Network, the Royal Bank of Canada, and the Walter and Duncan Gordan Foundation. Research, analysis, and writing were completed by Econics, a British Columbia-based firm that specializes in providing water sustainability services to local governments and utilities.

David Henderson, managing director at Toronto-based XPV Capital Corp., points out that, "We are living in that transformational era right now." The ideas in the report span organizations, jurisdictions, and professions, and can be embraced by anyone.

The idea at the heart of the report is that the decisions we make today will determine what the city looks like in

five, 10, and even 100 years. With a shared vision in place, taking small, frequent steps is possible. Together, we can navigate diversity and complexity, and ultimately move a real city toward a better future.

The full version can be found online at *www.blue-economy.ca*. WC



Kirk Stinchcombe and Louise Brennan are Sustainability Specialists at Econics. Jenn Willoughby is Manager of Strategic Marketing and Outreach at Canadian Water Network.

For more on urban water sustainability, check out this year's Canadian Water Summit on June 18, 2014. **watersummit.ca**

## Areas for Action

The water leaders interviewed in **BLUE CITY** identified four priority areas for action:

1. **Financial Responsibility:** Sustainable utilities focus on levels of service, develop asset management plans, and embrace life-cycle costing. In pricing services, utilities aim for full-cost recovery and structure their rates to influence behaviours.

2. **Progressive Regulation and Governance:** Progressive regulations and incentive-based programs complement each other in driving performance and ultimately achieving water sustainability goals. A well-designed utility governance structure facilitates information flow and achieves resource efficiencies.

3. **Customer-Oriented Information:** Utilities measure their performance. This facilitates transparent reporting and informs planning processes. In a sustainable city, information is shared, integrated, and audience-specific.

4. **Cutting-Edge Technology:** Transformative utilities figure out how to incorporate technology that makes source separation economically viable. Sustainable cities have infrastructure that maintains the natural environment and minimizes the impact of activities on native ecosystems.

Pre-cast concrete pipe column assembly and post-tensioning rods in the main storage shaft.

Credit: Steven Bertolo, R.V. Anderson Associates Limited

A shot of the concrete-lined stormwater tunnel.

Credit: David Crowder, R.V. Anderson Associates Limited

The pre-cast weir structure being lowered into place in the main storage shaft.

Credit: Tyler Lafft, R.V. Anderson Associates Limited

The minor system tunnel outlet at the main storage shaft.

Credit: David Crowder, R.V. Anderson Associates Limited

# Below and Beyond

The new West Don Lands outfall and treatment facility will take Toronto's stormwater management to the next level. BY RACHEL PHAN

**ON THE SURFACE,** the grate is inconspicuous—it doesn't appear to be any different than all the other sewer grates in the city of Toronto. The area where it's located is mostly devoid of foot traffic, save for a few people walking around in fluorescent safety vests and hard hats.

It is quiet and unremarkable—on the surface.

But below the surface is a labyrinth of tunnels and shafts, and the largest oil-grit separator of its kind in Canada. Located in the West Don Lands community, which has been characterized as "Toronto's next great neighbourhood," the West Don Lands stormwater quality facility and outfall is an impressive and innovative management system.

Currently consisting of three tunnels and one main shaft, the facility has been in the works since 2007. It services the West Don Lands community and any future development in the North Keating portion of the Lower Don Lands. The West Don Lands, an 80-acre site spanning from Parliament Street to the Don River and King Street to the rail corridor, is also home to the 35-acre Athletes' Village for the 2015 Pan/Parapan American Games. The area is located within the floodplain of the Don River, which means flood mitigation was a key consideration in its development.

In 2007, the Ontario Realty Corp., which has since merged with infrastructure Ontario, began work on

canadian **water** summit 2014

**Toronto**
**June 18**

# WATER IN CITIES

Our cities are becoming increasingly water challenged. Local government and industry acknowledge the pressing challenges that we face. On June 18th, conference chair David Miller will help convene the 5th Annual Canadian Water Summit of leaders in water management, utilities, technology and government. Join us as we connect on paths that lead to solving Canadian urban water puzzles.

Luncheon Keynote: **Edward Burtynsky**

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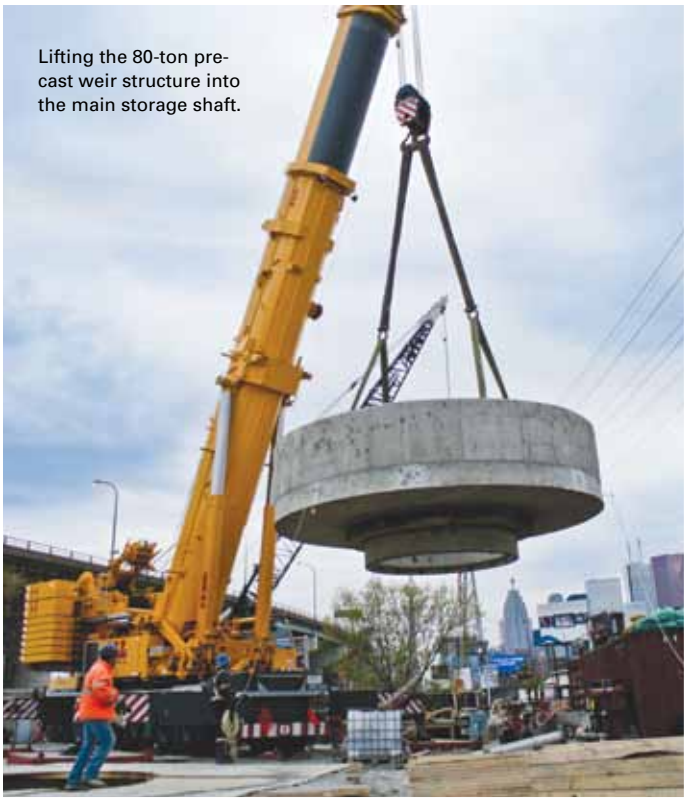
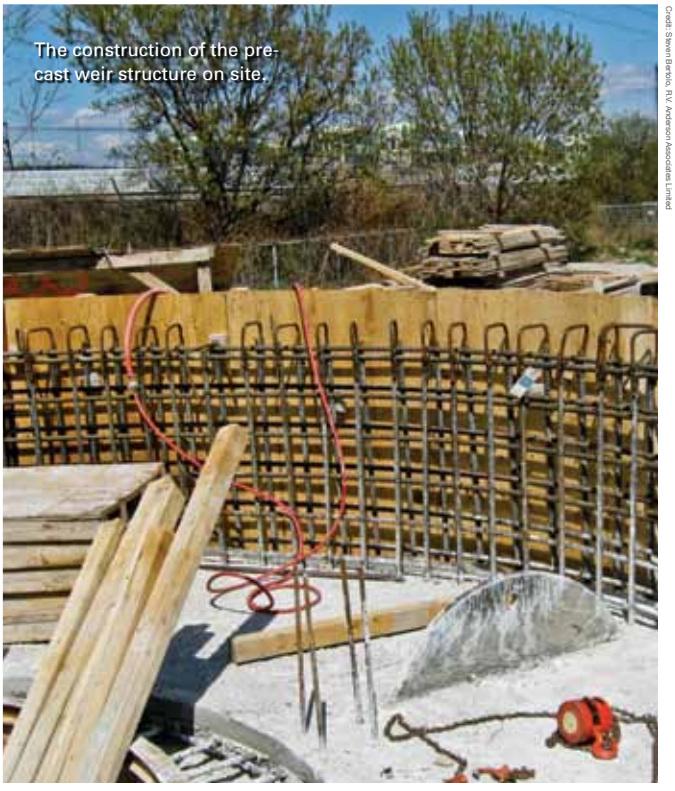


Lifting the 80-ton pre-cast weir structure into the main storage shaft.

Credit: Tyler Lahti, R.V. Anderson Associates Limited

Workers form the concrete tunnel intersection in the base of the main storage shaft.

Credit: Steven Bertolo, R.V. Anderson Associates Limited



The construction of the pre-cast weir structure on site.

Credit: Steven Bertolo, R.V. Anderson Associates Limited

The main storage shaft prior to the pre-cast weir tower assembly.

Credit: David Dowdell, R.V. Anderson Associates Limited

behalf of Waterfront Toronto to construct the area's massive flood protection landform, one that took more than $120 million and about 40,000 dump trucks worth of soil to build. It protects not only the West Don Lands, but a 210-hectare area, including Toronto's financial district, from flooding.

"This required the entire site to be regraded to drain away from the river, which required a new storm outfall to be installed," said Peter Langan, professional engineer and project manager of the facility as a principal at R.V. Anderson. "The new outfall is located along Cherry Street, leading to the Keating Channel."

Construction of the project commenced in May 2011 and the tunnels and shaft were completed in May 2012. The treatment building is the next phase of the project and will start in 2014 with completion expected in time for the games in summer 2015. The tunnels and shaft cost approximately $20 million, and the treatment building is estimated to be $10 million. The facility is part of Waterfront Toronto's $30-billion revitalization project.

As it stands, the treatment facility's main shaft is 25 metres deep and can store approximately 3,000 cubic metres of water. The concrete-lined tunnels are three metres in diameter, 350 metres long, and 25 metres deep. These tunnels were constructed deep in bedrock using a tunnel-boring machine.

"The main shaft will store stormwater so that we can pump it to the treatment system at a slower rate. The main shaft is like a shock absorber," Langan said. "It takes in all that rush of stormwater, and then we hold it there and we pump it at a slower rate to the treatment equipment. That allows us to use smaller, more economical treatment equipment."

The facility was designed with larger rainfall events in mind and is able to convey and manage very large storms to ensure the area is not impacted by heavy rainfall events, like the 2013 Toronto flood. The facility has a treatment rate of 750 litres per second and a peak flow rate of about four-and-a-half cubic metres per second.

Once the treatment building is constructed and completed, stormwater

will be conveyed through treatment equipment normally used in the water and wastewater industry. Langan said the implementation of this fully integrated stormwater management system to treat stormwater to a very high level will be the first of its kind in Canada.

"There are very few municipalities that have adopted rigorous stormwater management criteria like the City of Toronto with its Wet Weather Flow Management Plan guidelines," he said. "Under these guidelines, this stormwater management system incorporates three aspects: source water controls, conveyance controls, and end-of-pipe controls."

The first step in treatment is the oil-grit separator, which treats a large drainage area of more than 30 hectares. The flow will then be conveyed into storage where it will be pumped into the treatment building for further treatment: fine screening and a ballasted flocculation clarifier. UV disinfection will be the final stage in treatment before the water is discharged to Keating Channel.

"Let's get it as clean as we can before we put it into the lake," Langan said. "The city is endeavouring to improve the quality of the discharges to Lake Ontario, and this project demonstrates how to achieve a high level of treatment for stormwater."

Langan said the West Don Lands facility will be the start of a "real, tangible effort for environmental protection" regarding stormwater releases.

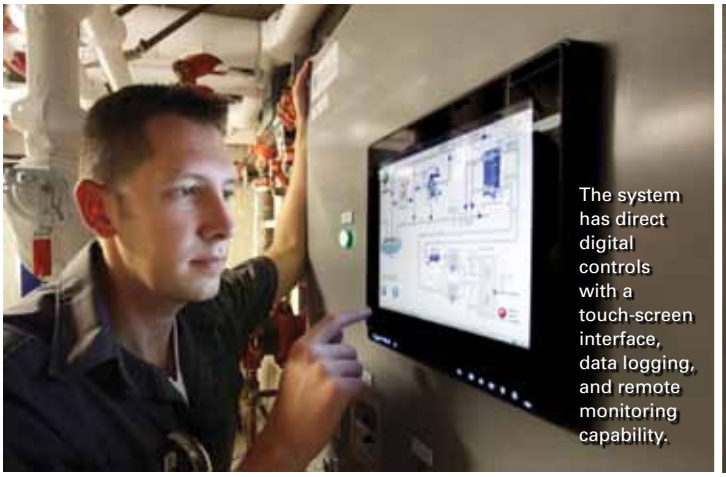
"The Greater Toronto Area has a huge drainage area going into Lake Ontario, and there are very few sites that are treated to this high level of quality. It's an incremental improvement," he said. "But you have to start somewhere. You have to do those little increments whenever you can, and it's when all these increments add up, 20 years down the road, you can see you've made a big difference." WC

Rachel Phan is Water Canada's managing editor.


International Wastewater Systems' SHARC sewage heat recovery system is fully sealed, odour free, and maintained by factory-trained personnel.


Personnel commission a sewage heat recovery system.

Credits: Rob Kruyt


The system has direct digital controls with a touch-screen interface, data logging, and remote monitoring capability.


The SHARC system control panel.


Domestic hot water pre-heat and finishing tanks.

# Wasted Potential

## Canadians may be flushing a huge source of energy down the drain.

BY LYNN MUELLER

**IT HAS BEEN ESTIMATED** by the U.S. Department of Energy that Americans flush 350 billion kilowatt-hours of energy into sewers each year. This wasted energy would be enough to supply 30 million homes. In fact, the typical North American pours 75 litres of hot water down the drain every day.

For a regular household, this can cost homeowners hundreds of dollars per year since water heating is the second highest source of energy demand in a home. But unbeknownst to some, it is now possible to capture 95 per cent of this wasted heat and recycle it back into our buildings using sewage heat recovery, which means the heat energy flowing down our drains never has to leave the building. Unlike solar or wind power, this technology doesn't require a quantum shift in the way we live or the way we think—it can simply be plugged into our existing infrastructure.

Water enters our buildings at 7°C to 9°C and leaves at 20°C to 25°C. Sewage heat recovery captures the heat in water leaving the building and uses it to reheat our hot-water tanks and the building itself. This technology is not complicated. First, a filter is used to separate out solids, which make up about two to three per cent of sewage. Then, with the help of a heat exchanger, the heat is transferred into clean water, and this warm, clean water is sent back into the building. At the end of the cycle, the clear sewer water picks up the solids extracted at the start and flushes it back into the municipal sewer system.

In the summer, buildings with sewage heat recovery systems can reverse their heat pumps and use the wastewater to reduce a building's air-conditioning costs. In this scenario, the pumps extract heat from the building and transfer it through the exchanger into the sewer water.

The potential reusable heat in wastewater has largely been ignored because sewage has "dirty" and negative associations. But today's sewage heat recovery systems are hermetically sealed, meaning there is no associated smell. They are also designed to be clog-proof with an automatic back flush to

filter sewage simply and effectively. Moreover, a monitoring system will flag any potential problems long before they become an issue.

Sewage heat recovery is gaining in popularity with operations underway in Norway, Japan, and China's Beijing South Railway Station. North American cities are now waking up to the fact that there is a valuable energy resource currently flowing under the city streets. Vancouver, Seattle, and Philadelphia have all started experimenting with sewage heat recovery systems.

In Vancouver, International Wastewater Systems has already installed sewage heat recovery systems, called SHARCs, into several public and private buildings, including the Gateway Theater in Richmond. The Gateway installation will be the first application in Canada that will use raw wastewater directly from the municipal sewer rather than the wastewater coming out of the building.

Although sewage heat recovery systems are applicable to any building, they work best with residential buildings of greater than 200 units or with institutional buildings like hospitals and prisons that have exceptional hot water usage. The most cost-effective time to introduce a heat recovery system into a building is while doing other energy upgrades or retrofits.

The potential reusable heat in wastewater has largely been ignored because sewage has "dirty" and negative associations.

The option of using sewage heat recovery on a district-wide scale is also being explored worldwide. District energy systems are large-scale, multi-building heating projects that can supply energy over a large area using either recovered energy from other buildings, industrial sources, waste, or by burning carbon-neutral fuels. Sewage heat recovery could easily plug in to district energy infrastructure.

While sewage may not be as exciting as fuel cells or tidal energy, the fact that it has a payback period of two to five years makes it perhaps the most cost-effective renewable energy system currently available. Sewage heat recovery systems also work at 500 to 600 per cent efficiency, meaning that for every dollar spent on operational costs, $5 of heat is recovered. Moreover, current systems are demonstrating consistent energy saving performance of 76 per cent. WC

Lynn Mueller is president of International Wastewater Systems in Vancouver.

Credits: Assembly of First Nations

Pumps at the Akwesasne water treatment plant on Cornwall Island, Ontario, which opened in 2006 and was the result of a collaboration between the Mohawks of Akwesasne and the federal government.

# Canada's Big Problem

Many of our First Nations communities still don't have access to clean drinking water—so what's being done?

BY IRVING LEBLANC

**FIRST NATIONS** in this country still struggle daily to get what every Canadian expects as a right: clean drinking water and proper sanitation. Numerous international instruments confirm these as fundamental and basic human rights, including the United Nations Declaration on the Right of Indigenous Peoples (UNDRIP). Many of Canada's First Nations are denied these rights despite infusions of targeted funding over many federal budgets since 2003, including the 2014 budget of $323.4 million over two years to continue the First Nations Water and Wastewater Action Plan.

As of January 31, 2014, there were 134 drinking water advisories in 88 First Nations communities across Canada. Ninety-six per cent, or 128, of these communities had advisories that were designated as continued advisories, many of which have been in place for several years. Almost 20 per cent of Canada's First Nations communities live with compromised drinking water. In fact, in Water Canada's March/April 2012 issue, there was an article about the Attawapiskat First Nation's struggles in getting safe and adequate supplies of potable water (*bit.ly/afnwater*). Now, almost two years later, this community is still looking to get a new water treatment plant and suitable source of raw water.

On November 1, 2013, the federal Safe Drinking Water for First Nations Act came into force. The government considers this legislation a vital step toward ensuring First Nations have the same health and safety protections for drinking water as other Canadians. It will allow the government to develop, in partnership with First Nations, enforceable federal regulations to ensure access to safe, clean, and reliable drinking water; the effective treatment of wastewater; and the protection of source water on First Nations lands.

First Nations do not oppose these regulations. The concern is the implementation and imposition of regulations without the required resources to support them. The Safe Drinking Water for First Nations Act was passed without the commitment of the funding for its implementation. This is one of the main objections First Nations have regarding this Act. In addition, the Act was carried out without full participation of First Nations peoples.

As the 2013 Assembly of First Nations (AFN) National Water Declaration says, "First Nations must be adequately and fairly consulted and accommodated prior to any decisions or actions related to our waters in Canada's provinces or territories. First Nations are entitled to free, prior, and informed consent to any activities within and surrounding our waters."

> As of January 31, 2014, there were 134 drinking water advisories in 88 First Nations communities across Canada.

The challenge then for First Nations is to continue to voice their objections over the manner in which the enabling legislation was devised while still trying to work with the government in this regulation development process. This is a delicate, but important, balance because not being involved invites the risk of being left out of the regulation development process altogether with the likely result that the government will unilaterally develop regulations that are unworkable,

On July 2011, AANDC released the results from its National Assessment of First Nations Water and Wastewater Systems.

**The study found of the 807 water systems inspected:**

- **314 (39 per cent)** were categorized as **high** overall risk
- **278 (34 per cent)** were categorized as **medium** overall risk
- **215 (27 per cent)** were categorized as **low** overall risk

**Of the 532 wastewater systems inspected:**

- **72 (14 per cent)** were categorized as **high** overall risk
- **272 (51 per cent)** were categorized as **medium** overall risk
- **188 (35 per cent)** were categorized as **low** overall risk

irrelevant, or completely inappropriate for First Nations. During the Government of Canada's "engagement" sessions in 2009—part of a consultation process leading to the development of a legislative framework for drinking water and wastewater in First Nations communities—Aboriginal Affairs and Northern Development Canada (AANDC) committed to the following process: "Once proposed legislation has been developed and passed by Parliament, further engagement with First Nations, regional First Nation organizations, and provinces/territories will take place on the development and implementation of federal regulations. [...] First Nations will play a role in all stages of the consultation process."

At the 2014 AFN National Infrastructure Conference and Tradeshow, the Atlantic Policy Congress of First Nations Chiefs presented a proposed option: a Regional First Nations Water Authority, whose purpose would be to manage the delivery of safe drinking water and wastewater disposal across participating First Nations communities. This proposal could employ a public-private partnership approach and could become a model for other regions to follow.

On July 2011, AANDC released the results from its National Assessment of First Nations Water and Wastewater Systems. The report determined that nationally, "based on the 10 year projected populations, the combined water and wastewater servicing needs are estimated to be $4.7 billion plus a projected operating and maintenance budget of $419 million per year."

This situation should be considered unacceptable by all Canadians—we can and should do more. We must never forget that we all need to work together to ensure safe, secure, and quality communities that nurture our children and give all First Nations hope and opportunity. Working together, we can make this goal a reality. WC

Irving Leblanc, P.Eng., is the associate director of Housing, Infrastructure, and Emergency Management with the Assembly of First Nations.

# Hot Potato

The Prince Edward Island potato industry is lobbying for deep well permits, but not without great resistance. BY RACHEL PHAN

**ON THE EAST COAST** of Canada, a contentious debate rages on over the Prince Edward Island Potato Board's request to have a moratorium lifted on deep-well water extraction for irrigation. The board, along with industry giant Cavendish Farms, began a full-scale lobby effort in January 2014 to push for deep-well permits, saying science indicates the Island has a high water-recharge rate. This has been met with significant backlash from environmentalists, citizen's groups, and political parties that say extracting tonnes of water out of the Island's deep water aquifer is risky business, especially since Prince Edward Island relies exclusively on groundwater.

"High-volume extraction could mean individual wells could dry up. There aren't a lot of central water systems here in P.E.I.," said Todd Dupuis, executive director of regional programs for the Atlantic Salmon Federation. "Often the country folk have their own wells, and if they're in close proximity to a monster well that's taking a lot of water out of the ground, it can actually really lower the water table to the point where your well no longer produces water."

The moratorium, which was initially intended to be in place for a year, has been in place since 2001. In the more than 10 years since the moratorium was put in place, the Prince Edward Island department of environment has studied the Island's water recharge rate. It released a provincial water extraction policy earlier this year around the same time the potato board began its lobby efforts, sparking claims the province is working in the interest of potato growers. The policy noted the province has "abundant groundwater recharge" of approximately two billion cubic metres a year, contradicting recent reports of a dwindling water supply in the province. (For more on this, see *bit.ly/peiwater*.)

"The department of environment found that […] less than seven per cent of the P.E. I. groundwater is used by all users," said Gary Linkletter, chairman of the Prince Edward Island Potato Board. "Of that seven per cent, […] industrial uses about 30 per cent and residential about 60 per cent. Currently, irrigation is hardly even a player in P.E.I. groundwater use.

"If there was a real concern about water use, these other users are the ones where a moratorium would actually make a difference. […] We feel it is only proper and fair that agriculture not be subject to the current, very selective moratorium."

> "It was pretty much just one provincial department that put the policy together, and it certainly has fingerprints all over it from the potato industry." —Todd Dupuis

Prince Edward Island potato growers have said that, without deep-water wells, productivity will decline and lead to the reduction of the province's $1-billion potato industry. Some growers have expressed concerns over staying competitive, especially since American farmers can sometimes harvest twice the

amount of potatoes from one acre.

"We're not even close to that in Canada because we don't have the longer growing season or access to irrigation," Kevin MacIsaac, chair of the United Potato Growers of Canada, told The Guardian.

Dupuis expressed suspicion over the new department of environment policy, especially since he said it came "out of the blue."

"The new water-withdrawal policy makes a case for irrigation for the potato industry and it was a bit of a surprise to us that the policy came out," he said. "It was pretty much just one provincial department that put the policy together, and it certainly has fingerprints all over it from the potato industry."

Along with questions over the ability of the province's deep-water aquifer to handle high-volume extraction, others have raised concerns over the potential increased contamination of drinking water. Government data already suggests that nearly all of the province's drinking water is contaminated with nitrates.

"[Growers] add more fertilizer than they need, and that stuff is very water soluble and full of nitrate and phosphate," Dupuis said. "There's always stuff left over: it leeches down into the soil, and the soil in P.E.I. is sandstone, so it is very porous. The water up high is latent with fertilizer and percolates down."

Linkletter said the contamination of aquifers by fertilizers is actually exacerbated by dry conditions. "Proper moisture conditions for the crop to grow would reduce what fertilizer is left in the soil. […] It would be more likely to reduce problems rather than increase them."

He added that the deep-well extraction for irrigation would only occur for a very limited portion of the year, and that such wells would be monitored to ensure "responsible supplemental irrigation."

Since the potato industry has made its request to the province to remove the moratorium, there has been an impassioned response from concerned islanders who are attending usually empty committee meetings in droves. A February 26 meeting was attended by 200 Prince Edward Islanders, including biologist Darryl Guignon, who said, "None of us have been asked anything about this. Nor the department of fisheries and oceans, nor the public! It's our water for heaven's sakes, and we can't even have an input in a water policy?"

Environment Minister Janice Sherry has said the provincial government will not make a decision on deep-well irrigation and the moratorium will not be lifted until there is further proof that such practices would not diminish the quantity or quality of Prince Edward Island's groundwater. WC

Rachel Phan is Water Canada's managing editor.

Credit: Eric Kilby

Ecojustice alleges diseased farmed Atlantic salmon have been unlawfully transferred into open-pen fish farms.

# A Legal Hotbed

Environmental groups in British Columbia are fighting to force the government into using legislation to protect its waterways.

BY SIOBHAN MCCLELLAND

**ENVIRONMENTAL GROUPS** are testing the litigation waters in British Columbia to challenge government actions that put the marine environment at risk.

Right now, British Columbia is a hotbed for environmental issues, with private companies interested in using the province's waterways as part of their operations, including fracking and natural gas businesses.

But Ecojustice, a Vancouver-based organization that represents several environmental groups, is pursuing many legal cases against the government. The organization claims the government hasn't used its legislation or has violated its legislation, resulting in too much power being handed over to private companies that are making decisions that affect the environment.

While there are environmental laws that provide protection for Canada's waterways and marine life, some question how effective the legislation is.

"It's frustrating to have legislation on the books, which the various levels of government ignore or interpret in a manner different than what was represented to the populace when proclaimed," Maureen Bell, a Calgary environmental lawyer, said. "In such cases, the politicians get full points for creating the legislation, but if it languishes on the shelf or is perverted in its application, it isn't much good."

Margot Venton, a staff lawyer at Ecojustice, said that people have been using the courts to try to protect the marine environment since the 1980s, when the rules changed to allow public interest parties standing, or the ability to become involved in environmental cases and bring lawsuits.

"I think right now, in the British Columbia coast, there's a lot of tension over how we will develop resources and what we are willing to risk in the development of these resources," Venton said. "Some of the potential resource uses, like pipelines or fish farms or whatever it is, are really placing these issues front and centre in people's minds, and we're realizing that the threat is becoming really obvious."

Ecojustice is currently challenging the British Columbia Oil and Gas Commission's decision to issue short-term water approvals to fracking companies, arguing that the companies should have to go through the more stringent process of bringing water-license applications.

Ecojustice staff lawyer Randy Christensen said short-term water approvals, which are usually good for two years, are being renewed by the same company five or six times. He said Ecojustice wants the companies that use water for fracking purposes to go into the water-licensing process, where the government would then assess the impact of the water withdrawals more carefully and look at the cumulative impacts of many water withdrawals in one area.

> "Politicians get full points for creating the legislation, but if it languishes on the shelf or is perverted in its application, it isn't much good." —Maureen Bell

"Our concern right now is that there are really two different routes of getting the water. One has minimal oversight and one has more robust oversight," Christensen said.

He added that the cumulative impact of the fracking operations could affect water flow conditions in certain areas and fluctuations in water flow could affect the life cycles of fish in rivers and streams. This could possibly result in shortages at certain times of the year that would affect other people's water use.

"These are all the kinds of things

that need to go through the licensing process so that you have studies and assessments, and you know the impact of what those uses could be," Christensen said.

Fracking operations aren't the only concern for Ecojustice. In another case, Ecojustice alleges diseased farmed Atlantic salmon have been unlawfully transferred into an open-pen fish farm, where the diseased fish would share water with wild fish. The claim is that Fisheries and Oceans Canada has unlawfully given a private company the power to decide whether to transfer the diseased salmon.

Venton said decisions about the risks associated with the transfer of diseased fish should be made by the government, not private companies.

"It's more appropriate for the government to make the call about that risk than it is for a private individual or private company running a farm to make that call," she said, arguing that the law doesn't allow anyone to put fish that may carry a diseased agent into the ocean because this could potentially harm the conservation and protection of fish in the ocean.

"I think there is a general trend, in particular in the federal government, to get out of the business of governing," she said, adding that this is her personal opinion. "There's also a trend in Canada toward deregulation and toward handing more and more power and decision making to the companies, with less and less oversight. You see that in British Columbia."

Kirsten Ruecker, a communications advisor at Fisheries and Oceans' office in the Pacific Region, wrote in an email that the government was unable to comment on the fracking and salmon cases as these matters are currently before the courts.

The fracking case does not have a hearing date yet. The salmon-farming case is scheduled for a hearing on June 9. WC

Siobhan McClelland is a former lawyer now working as a freelance journalist and the new media editor at *Canadian Geographic*. She has written for several law publications on a variety of topics.

Raj Kurichh, co-founder and chief marketing officer of NanoStruck Technologies, holds wastewater effluent containing toxic levels of chemicals while Bundeep Singh Rangar, interim CEO and chairman, demonstrates safe, clean water using NanoStruck's technology powder.

Credit: Rob Benhema, Courtesy of The Mississauga News

# Shell-Shocked

## How can crustacean-inspired technology be used in innovative water treatment systems?

BY CLARK KINGSBURY

**INSPIRATION CAN BE FOUND** everywhere: from polluted harbours to South African mines. At least this has been the case for NanoStruck, a water treatment company in Mississauga, Ontario that employs innovative technology to remove molecular-sized particles using absorptive polymers. Primarily focused on treating water for environmental disposal or industrial use in sites like Mexican landfills, the company has recently branched out into a potentially lucrative partnership with the mining industry.

"What differentiates us is that our process of cleaning water does not involve reverse osmosis, distillation, toxic chemicals, or any expensive techniques," says NanoStruck CEO and chairman Bundeep Singh Rangar. "Our system takes advantage of something in nature. We're utilizing something that exists in nature for human and industrial purposes."

Rangar is talking about chitosan copolymer, or a molecular sponge that takes the form of a highly absorbent white powder. This powder is the key to NanoStruck's technology. "Our system is one where you mix the contaminated water and this powder, and the powder traps the contaminants," he explains. "That's the core of what we do. These molecular sponges can trap pathogens, hydrocarbons, organic waste, heavy metals—whatever is in the water."

For the source of inspiration for this powerful powder, look no further than your grocer's freezer.

"The powder is an extract from crustacean shells," Rangar says. "If you think about it, scientists have always known that shrimp have kept alive in contaminated spaces—dirty harbours, for example—and what keeps them alive is their shell. It's a very effective filter that nature provides for us. The question that scientists have is, 'How do you reuse that shell for human consumption, or human industrial use?'"

It's a question that was solved by researchers in the University of Saskatchewan's chemistry department. Eight years of development eventually yielded the powder, which is derived from several sea creatures, but mostly from shrimp. The product is a tunable polymer notable for its programmability because the researchers made it possible to program the polymer to absorb whatever specific particles are desired.

"When we go to a customer to pitch our solution, or when somebody comes to us with a problem to solve, the first thing we do is get samples of water," Rangar says. Next, the water is run through NanoStruck's system to determine what sorts of intoxicants are present. "We can then

tune the polymers to attack those specific substances, those specific materials."

Naturally, the treatment process is not as simple as throwing water into a powdered canister or barrel. It is put through a number of processes—dissolved air flotation, electrocoagulation, and multimedia nano filtration—to get rid of contaminants prior to using the chitosan polymer, which then catches any substances, particles, or metals not caught before. Most commonly, these include materials that are soluble in water, including organic waste, food substances, alcohol, sugar, complex sugar compounds, soaps, and hormones. Once this stage of the treatment process is complete, the water is compliant for environmental disposal or industrial use. In cases where a client desires potable water as an end result, the water would be taken through one further treatment stage involving ultraviolet, ozone, or ultrasonic processes.

While treating water for disposal is certainly a vital part of NanoStruck's business, the company has also discovered a use for its technology within the mining sector.

"We've basically got two sides to the house," Rangar explains. "When we went to South Africa, one of the challenges they had was both getting fresh water [and] treating water that they used in industry to recycle and use again so as not to deplete their fresh water sources."

In South Africa, the NanoStruck team was asked if the technology could remove precious metals from mine tailings. A potential problem emerged.

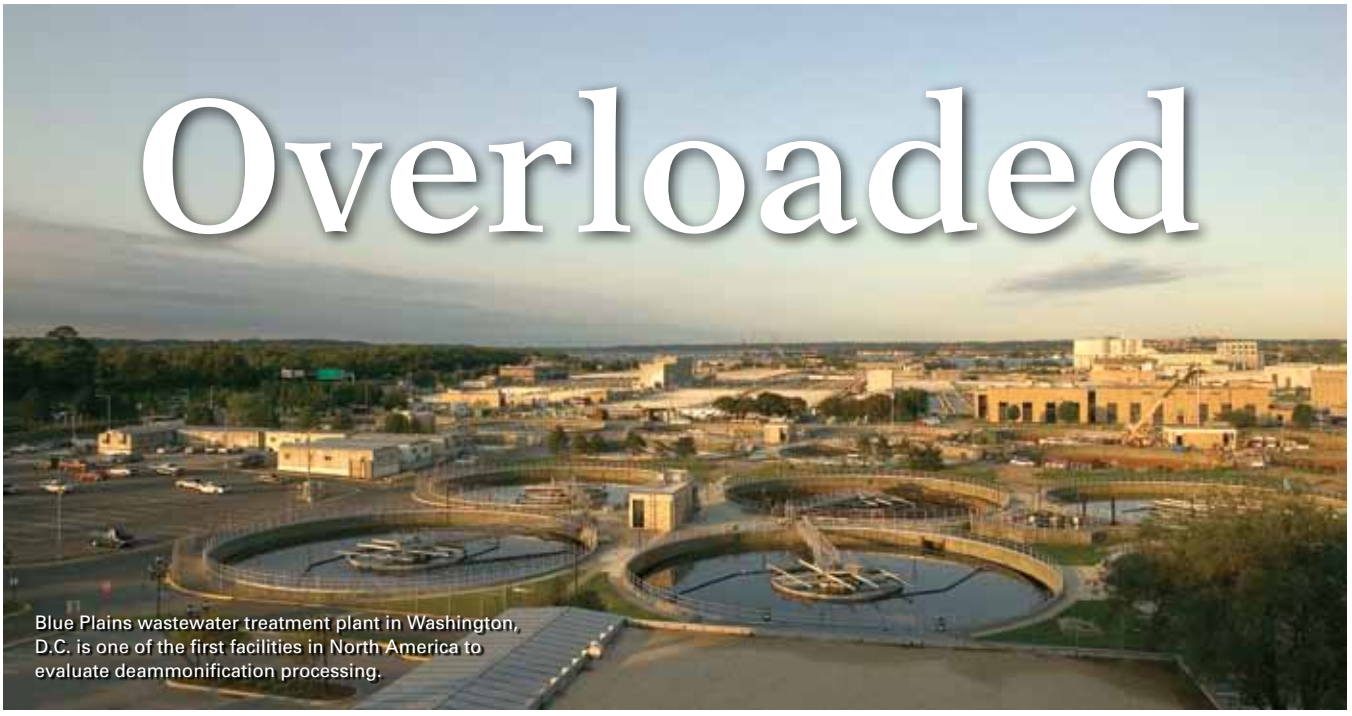
"While we can take out particles that are unwanted or undesirable, the flip side of that is you can take out particles that are wanted and desirable," Rangar says. "As far as the polymer is concerned, it's like an attack dog: you say seek and hunt and retrieve, and it doesn't care if it's mercury or platinum. Our whole business model shifted."

Since beginning their investigation into this second side of their business, the company has had some very encouraging results. They've achieved high recovery rates for metals like silver, gold, platinum, and palladium in tailings sites in both Africa and Latin America, and they are now looking to bring the technology to Ontario.

Although some of the company's successes have come from large international projects, the scalable nature of the technology has allowed it to help a wide range of clients, including a Mississauga ice cream shop and a pilot project at a GO bus wash site in Ontario's Halton Region. The technology may also have the capacity for use in municipal water treatment systems. WC

Clark Kingsbury is Water Canada's assistant editor.

# Overloaded



Credit: AECOM

Blue Plains wastewater treatment plant in Washington, D.C. is one of the first facilities in North America to evaluate deammonification processing.

Deammonification processing can address Canada's nutrient problem, especially in a severely threatened Lake Winnipeg. BY SIMON BAKER AND BEVERLEY STINSON

**IN 2013,** Lake Winnipeg was named the world's "Threatened Lake of the Year" because of increasing pollution from agricultural run-off and sewage discharges. Excessive nutrients—particularly nitrogen and phosphorus—in Canada's lakes and rivers are becoming a growing public concern. In response, Environment Canada has launched two major government programs worth millions of dollars: the Lake Winnipeg Basin Stewardship Fund and the Great Lakes Nutrient Initiative.

Research has focused on the specific role of municipal wastewater treatment in contributing to the problem. Analyzing more than 116,000 tonnes of nutrients released from public and private industrial facilities, a study by the federal government's National Pollutant Release Inventory reported that 85 per cent originated from municipal water and sewage systems.

Municipal wastewater treatment can include nitrogen removal processing to help reduce the level of total nitrogen in effluent prior to its discharge. One of the most common methods is nitrification/denitrification. It is a two-step process that involves first converting the wastewater's ammonia content into nitrates so that it can then be converted into nitrogen gas, a harmless byproduct.

A typical wastewater treatment plant can reduce total nitrogen levels in effluent down to 5 mg/L in the winter and less than 1 mg/L in the summer using nitrification/denitrification processing, according to the Canadian Council of Ministers of the Environment. This approach is not, however, without its disadvantages. It involves significant power consumption and, in some cases, the use of costly and hazardous chemicals, predominantly methanol.

Nitrification/denitrification processing is the conventional option, but if growing public concern over water quality issues leads to new or more stringent nutrient removal requirements for wastewater treatment processing, the associated rise in operating costs will likely be significant.

A growing awareness of this problem within North America's municipal water sector is leading some to consider an emerging solution—deammonification—to help reduce both the energy and chemical costs of conventional processing. Deammonification is based on the innovative development of a new method using the anaerobic ammonium-oxidizing (anammox) microbial process.

This microbial process involves a previously unknown bacterium, first discovered in 1995 by scientists at Delft Technical University in the Netherlands. The bacterium's unique characteristics provide a completely different metabolic pathway. Nitrogen can be processed under anaerobic conditions, rather than aerobic conditions, thereby reducing energy and chemical costs.

> Deammonification could provide a significant savings in power consumption and methanol, representing an 83 per cent reduction in operating costs.

The greatest opportunity to reduce energy and chemical costs with deammonification lies in adapting the technology to mainstream treatment configurations. Achieving this goal is the focus of an international collaborative

research effort. The team is led by water agencies in Austria (Achental-Inntal-Zillerta Waterboard) and the United States (District of Columbia Water and Sewer Authority and the Hampton Roads Sanitation District, Virginia) and supported by ARA Consult GmbH and AECOM.

Extensive bench and pilot scale work was undertaken at the Blue Plains wastewater treatment plant in Washington, D.C., and smaller facilities in Virginia to explore viable control strategies for mainstream deammonification with great success.

The existing nitrification/denitrification configuration at Blue Plains was identified as the plant's largest energy-consuming process, accounting for 27 per cent of the total electrical demand. The chemical cost of the methanol required for the processing totals between US$9 million and US$10 million per year. The results from a pilot study and demonstration phase using a mainstream deammonification configuration indicated Blue Plains could obtain a theoretical 65 per cent savings in energy and a 90 per cent savings in chemicals while meeting stringent effluent discharge requirements for nitrogen.

Based on those findings, the team launched a project at the Strass wastewater treatment plant, near Innsbruck, Austria, in 2011, which successfully demonstrated the feasibility of a mainstream deammonification configuration. The plant was able to remove more nitrogen and maintain more stable performance while operating under deammonification than it had achieved while operating in the conventional method during the previous winter.

While the work in Austria and the United States is helping develop deammonification into a proven solution for mainstream treatment configurations, the first, albeit smaller, steps in Canada are taking place in terms of the technology's application to sidestream treatment.

Last year, the City of Winnipeg retained AECOM to prepare an optimization study for the centrate treatment plant at its North End Water Pollution Control Centre, Winnipeg's largest wastewater treatment plant. The study looked at a review of alternative configurations, including sidestream deammonification, to explore options for reducing the energy and chemical costs related to nutrient removal.

Using the plant's current nitrification/denitrification configuration as a performance measure, the study suggested deammonification could provide a significant savings in power consumption and methanol, representing an 83 per cent reduction in operating costs when compared to the reference case. Deammonification's results in lowering these operating costs were also significantly better than those achieved through the other conventional alternatives examined, which ranged from four to 42 per cent.

Canada has a strong track record in responding to concerns over water quality issues. After being declared "dead" in the 1960s, Ontario's Lake Erie became an environmental recovery success story once wastewater treatment plants began to treat effluent by removing phosphorus loads. It is a valuable lesson to remember, but one that comes with an important distinction.

If today's municipal plants were similarly required to improve their treatment capabilities, they would be doing so in a far different operating environment than their counterparts of more than 50 years ago. Any upgrade investment would need to anticipate the continuing steep rise in associated energy and chemical costs.

The potential of deammonification lies in its value of offering a solution to the environmental challenge of reducing nutrient loads, but at the same time allowing operators to manage the inescapable economic realities involved in this challenge. WC

Simon Baker is a Winnipeg-based, AECOM wastewater expert. Beverley Stinson is AECOM's technical lead for biological nutrient removal and director of applied research.

# Risk Managed

Developing a systematic approach to risk management for different types of assets can help municipalities allocate limited funds and anticipate infrastructure threats.

BY CAREESA GEE AND ROOP LUTCHMAN

**FLOODED BASEMENTS.** Extended power outages. Watermain breaks. Downtown districts at a standstill. Frozen or submerged transit. Major cities across Canada found themselves dealing with extreme weather events in 2013 while simultaneously trimming their budgets and facing renewed public questioning about the vulnerability of our infrastructure. These catastrophic events demonstrated the need for a firm grasp on risk management practices to better manage water infrastructure. The consequences of having the system compromised could be severe and even life-threatening in the worst cases.

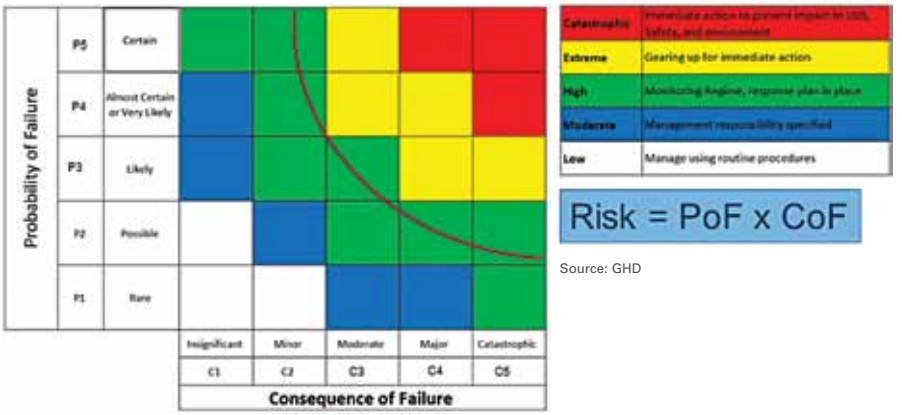
For many years, utility managers managed risks the old-fashioned way: through gut feelings and intuition. Experienced managers eventually built up enough skills and knowledge that they became good at taking risks. However, this experience was not easily passed on to other staff. By formalizing effective risk management, a utility can improve its decision-making process by balancing levels of service and cost of service, helping them to make the best use of scarce resources. In Ontario, the Region of Peel undertook a comprehensive risk assessment as part of strategic planning for linear assets—transmission and sub-transmission infrastructure—to help it with the job of delivering drinking water services.

## The Peel Risk Assessment Project: Linear Infrastructure

The Peel water supply system has a total of 4,500 watermains that cover 700 kilometres. Pipe diameters range from 300 to 2,100 millimetres with seven pressure zones. Meanwhile, Peel's population is expected to grow from its current 1.3 million to approximately 2.5 million in the next two decades. The region needs to fund new infrastructure while also maintaining the existing aging pipes, all within the constraints of a rate-based water supply system that is supplemented with new development charges. In order to continue meeting customer expectations and to stay abreast of new regulations, it chose a risk-based approach to help prioritize capital expenditure.

To achieve this, there were four main project objectives: to characterize risk associated with transmission and sub-transmission watermains; to develop risk management plans for high risk/critical assets; to develop a long-term capital plan to reduce overall risk; and to develop a risk tool to repeat and update risk assessment.

**Figure 1: Project Approach – Risk Mapping and Decision Making**




Source: GHD

The project approach included the following steps from the AWWA J100 standard:

1. Defining features such as size, flow rate, and location, and defining levels of service to establish asset characterization;
2. Defining risk scenarios like breaks, pressure, and demand to determine threat characterization and to articulate a consequence analysis;
3. Determining the likelihood of risks by using experience/judgment and historical data to conduct a vulnerability analysis and come up with a threat assessment;
4. Developing risk profiles/categories/classifications for your risk assessment;
5. Developing mitigation plans and strategies to manage risk.

Risk was defined as:
**Risk = (Likelihood x Vulnerability) x (Consequence x Resilience)**

An important part of the process was developing a risk map (*See Figure 1*) that juxtaposed the consequence of a failure (from "insignificant" to "catastrophic") to the probability of the event occurring (from "rare" to "certain"). The red line represents the risk tolerance or threshold.

Leading global engineering, architecture, and environmental consulting company GHD is assisting the Peel Region to develop a systematic approach for risk management. Aman Singh, business consulting manager with GHD, explained that, "Typically, the red line is determined in part by political appetite for risk and also based on available funding and resources."

Singh, who was project manager on the Peel Region project, added, "Every single day you are trying to push back the risks that are sitting above the line, but at the same time, all the risks and assets

that sit below the line are continuing to age and are continuing to push up against the line, so your daily decisions revolve around this map and trying to keep risks above and below the line."

## Utilizing three technology tools

InfoWater water-distribution modelling software was used to update system hydraulics and to look at the impact of pipe breaks on the overall system. The ESRI geographic information system (GIS) tool was used for a spatial analysis of pipes to support the evaluation of probability and consequence of pipe failure. GIS data was then uploaded into a custom risk management tool that was developed to log and track pipe information. For example, each pipe was evaluated against 16 threat events such as corrosion, and given an overall risk score, with the user able to change the vulnerability/resilience and the probability of failure level. The user is also able to see the impact of implementing various risk-mitigation strategies.

## Better spending

An important outcome of the project was translating the risk score into a dollar value. A consequence-of-failure matrix was developed, which considered the impact on service of each of the threat events. These impacts were quantified in dollar values on the continuum of "insignificant" to "catastrophic."

"Once you have the cost consequence of a risk, you can use it to help make a business case to evaluate various mitigation strategies," Singh explained.

"Before this, there were a lot of projects in our capital plan that were put in based on what we thought were high-priority projects, but this process helped us to validate those projects and to have a strong business case and justification for why these projects are in our capital plan," said Imran Motala, manager of capital planning at the Region of Peel. "It also helped to identify projects that were not needed."

Peel intends to extend this approach in the future to the region's water distribution, as well as its storm and sanitary sewers, so that it can continue to use a consistent risk-management framework and tool. This will support informed decision making with respect to the region's asset management and capital expenditure programs, and help allocate limited resources to the high-risk areas of its water system.

"The process that we went through […] was really helpful in giving us a strong footing and foundation for how we do risk management and risk mitigation planning for transmission mains," Motala said. He added that the process was even more beneficial because it "gave us the ability to build a solid business case for investment in our infrastructure that could be presented to senior management and regional council." WC

Careesa Gee is a communications and events specialist at GHD and Roop Lutchman is the leader of business consulting at GHD.

Credit: Donya Danesh and Sarah Thompson

Donya Danesh and Sarah Thompson, co-chairs and co-founders of the Water Initiative for the Future (WatIF): Graduate Conference, sit along the Kingston shoreline of Lake Ontario.

# For Us, By Us

Two Queen's University students co-chair a conference to encourage collaboration among academics preparing to enter Canada's water industry.

BY CLARK KINGSBURY

**IN THE CANADIAN WATER INDUSTRY,** professionals from different regions work with unique natural challenges and political systems. Organizers behind the Water Initiative for the Future (WatIF), an upcoming national conference for university graduate students in the water sector, hope to overcome these challenges by promoting early career collaboration.

Donya Danesh, a PhD student in Queen's University's biology department, and Sarah Thompson, a master's student in the Queen's department of civil engineering, are co-chairs of the upcoming conference. WatIF will be hosted by Queen's and will gather students preparing to enter careers in the water industry from across the country. Together with an organizing committee composed of students from a number of diverse disciplines, Danesh and Thompson are hoping to create a unique event that will encourage future collaboration across disciplinary, geographical, and institutional lines.

The 2014 version of the event, taking place May 4 to 6, will include students from universities across Canada; last year, the event was limited to students in Kingston, Ontario.

"We were asked to run a student-run local symposium to bridge the gap between Queen's and Royal Military College," Danesh says. "We brought together over 90 students and professors from both campuses, and students had the chance to see the type of water research that was happening on both campuses. It was just amazing to see how engaged and excited students were to be talking to each other—their own peers—about water research."

While Danesh and Thompson consider the 2013 symposium to have been a success, it also opened their eyes to the limitations of performing research in the restricted settings of disparate academic institutions. The 2014 conference will highlight the need for collaboration and communication across geographical and disciplinary boundaries.

"What we wanted to do this year was make it more interactive," Thompson says. "Last year, the event only lasted a day, and everyone was giving a presentation. It was great, and academically very useful, but we want to meet the attendees' academic requirements and provide an experience that's more than just a one-way conversation."

Danesh adds, "We want to get these upcoming water leaders comfortable with collaborating, with interacting with each other, with getting comfortable with talking to people outside their field of research, but focusing on the same topics."

> "There's been huge momentum here and we've had a very positive reaction from students and industry saying, 'This is needed.'" —Donya Danesh

To address these needs, organizers have included a water-trivia-style event in the program, as well as a poster hour where students will have the opportunity to present posters explaining their research to working professionals in the water industry. The poster hour will lead

directly into a networking event called "Expert Evening," where students will be able to interact with attending water professionals.

Despite the inclusion of these water industry pros in the networking portions of the conference, organizers have placed a heavy emphasis on the student-oriented nature of the event.

"There are a lot of conferences out there that are organized by industry, but they offer something completely different from what we offer," Danesh says. "They provide guidance, and we get to see what fully developed projects people far along in their careers are doing, but there doesn't really exist a conference that is fully focused on students in the water industry, and I think that as students, we are the only ones fully able to recognize the need for that."

Perhaps the most important opportunity that WatIF provides is the chance for students to network with one another and create working relationships at the onset of their careers.

"One of the main things we want to achieve is to create a community of early water leaders," Thompson says. "We wanted to create an environment that doesn't exist right now where young researchers at the beginning stages of their careers could come together to develop a long-lasting relationship, looking forward to the future."

The organizers are hoping that creating professional relationships as early as possible will encourage collaboration across some of the geographic and political lines that currently divide policy and research. As they are eager to point out, water is a trans-boundary issue.

"There's a lot of red tape that exists in Canada right now, a lot of policy based on provincial or territorial perspectives, as opposed to a national view," Thompson says. "Canada is so diverse; we all have different water challenges from province to province and territory to territory."

This mentality of encouraging collaboration across the country also informs the organizers' enthusiasm for cross-discipline interaction. WatIF will emphasize the limitations of tackling water challenges with a "siloed approach" and instead promote multidisciplinary interaction in pursuit of solutions.

This is the first year WatIF is being organized as a national conference, but Danesh and Thompson are confident it will take on a life of its own after they graduate and it comes under the guidance of incoming students.

"Sarah and I and our committee of grad students have our own dream of what we could do with this conference," Danesh says. "It will definitely be at least a biannual event. There's been huge momentum here and we've had a very positive reaction from students and industry saying, 'This is needed.'" WC

Clark Kingsbury is Water Canada's assistant editor.

# P3s in the Water Sector

BY ROBERT HALLER

**WHEN THE FEDERAL GOVERNMENT** announced its Long Term Infrastructure Plan in 2012, it placed a lot of emphasis on the potential of public-private partnerships (P3s). This was not surprising coming from a business-minded government that looks to the marketplace as part of the solution.

During one of the 2012 regional roundtables on the plan—put on by the federal government to increase its understanding of the ground-level challenges municipalities face—the Canadian Water and Wastewater Association (CWWA) suggested that an infrastructure plan should be more than just another funding program. The association asked the federal government to provide new programs to assist communities in proper asset management and financing opportunities. The CWWA had some doubts about P3s being the panacea to solve all of the sector's problems, but in the past couple of years, there has been a growing interest in the P3 model for some substantial water and wastewater projects in Canada.

Last fall, I had the honour of moderating a fascinating panel session dedicated to water projects at the Canadian Council for Public-Private Partnerships' national conference in Toronto. Saint John, New Brunswick shared its success story of a completed project while we heard about a new project in Victoria, British Columbia just getting underway. Meanwhile, EPCOR has been involved in various models for years, both in Canada and the United States. The financial gurus are figuring out how to make long-term water/wastewater projects viable for P3 investors, but the wild cards still remain the public opinion and the fear of the "privatization" of water.

For me, the most interesting story so far has been in Regina, where we followed a very intelligent discussion about the possibility of a P3-funded sewage plant. This engaged the community and gained public support, which was verified in a referendum. The City of Regina will still have ownership and control of the facility, but the financing and risk are shared with a partner that has a vested interest in staying on budget and on time. This partner will also insist on proper maintenance schedules to retain and prolong the value of the investment.

Still, the rule of thumb is that you can't get in the door at P3 Canada with any project less than $100 million. The paperwork and initial investment for a P3 process is greater than what many communities can handle on their own. So what can we learn from the P3 model? What are the elements we can translate into a model for medium and small communities?

If there is one thing I've learned about P3s, it's that they are not another grant program. P3s require a complete rethinking of your processes and policies—a paradigm shift. It's all about real asset management, taking into account the facility's entire life cycle. It demands proper maintenance that cannot be easily deferred (something for which municipal governments are notorious). It's about operating and financing a profitable yet affordable service. It's about bringing in business-minded partners that share the risks while maintaining the public governance and trust. There lies our challenge. WC

Robert Haller is the executive director of the Canadian Water and Wastewater Association.

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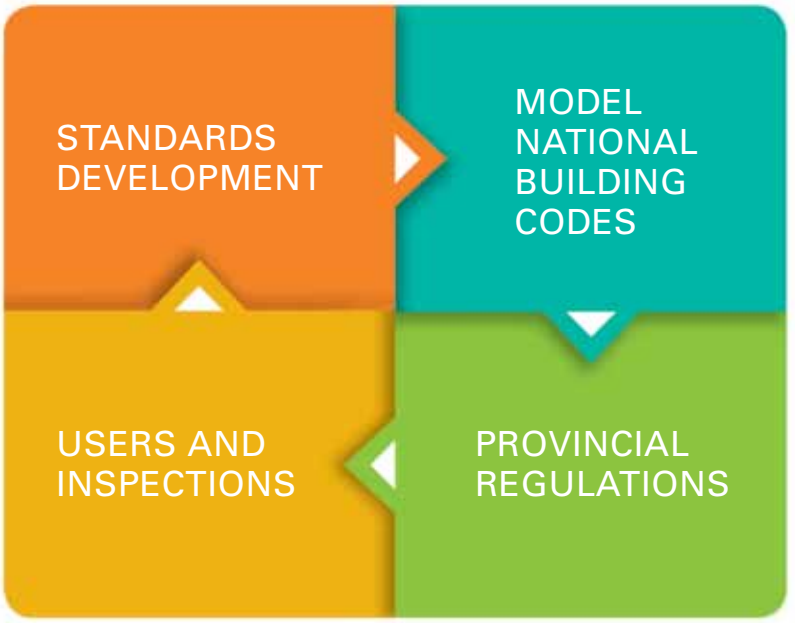



# The Regulatory Ecosystem

One man learns how codes and standards in the water sector are deeply interconnected and how local initiatives and bylaws must be aligned with them.

BY KEVIN WONG

**A FEW YEARS AGO,** there was an incident that happened to a chief plumbing inspector in a big city in Canada—let's call him "Joe." Joe learned about water recovery and harvesting and thought it would be a grand idea to implement in his town—well ahead of just about everyone else. His driving ideal was that it could solve a small, but growing, issue the municipality had with water: its water utility was becoming starved. Business was booming and the town's residences were growing rapidly, and as a result, the city was running out of the ability to provide potable water for everyone.

His idea was to change the municipal bylaws to allow rainwater harvesting in many buildings for irrigation and flushing of toilets. The rainwater harvesting would also take place in industrial applications, like cooling towers, and in city works, like watering the city's planters and boulevards.

This was a great idea in concept, but if done incorrectly, could lead to potentially disastrous results.

Joe first floated the idea by a few close friends and was told the following:

1. He needed to take the context of water out of his individual jurisdiction. Nature has no boundaries: Rainwater recharges aquifers and rivers flow both in and out of our jurisdictions. Any changes, such as the ones he was proposing, can affect natural systems dependant on the flow of water.

2. To fully understand the impacts of this type of disruptive policy change, he'd need to consult with a fairly diverse group of peers both inside and outside of his jurisdiction before proposing any type of regulation (for example, don't start drafting a bylaw based on what someone else has done or on something found on the Internet). He was bluntly told to do his homework and consult widely rather than notifying everyone after the bylaw was proposed.

3. Revolutionary changes like this may infringe on other jurisdictions and agencies.

Thankfully, Joe listened and consulted, first with his provincial peers, then with industry, and the inspectors. Here is what he learned:

- Individual jurisdictions can't divert a sizeable percentage of rainwater for urban applications in an arid environment without affecting the ecology and environment.
- Agriculture and communities downstream depend on the stability of both the quality and quantity of surface and groundwater supplies. Any changes to this would affect regional water systems. By diverting rainwater for use, he may affect recharge areas for aquifers, and, by diverting stormwater, surface water inputs may be affected.
- The treated wastewater volumes may go up, but the costs to the plant could make it prohibitive. To treat a million gallons of sewage, he'd need 1,000 kilowatt hours, which he could recover from the consumer via the water bill. If half of that was diverted rainwater, the utility would have to come up with an alternative method of recovering costs. This is not an easy task.
- Aside from the energy concerns to treat all this water, the natural environment's hydrologic cycle could be affected in the small and large scale. This was an environmental concern.
- The health inspectors were worried about storage and disinfection, and the obvious question of, "What if someone drank that water accidentally? What's the risk?" That conversation circled around inspections for water safety, especially on commercial and residential systems. This conversation happened before the development of performance standards for water-reuse systems currently laid out in CSA B128.3.
- The water utility was concerned about cross connections, backflow, and the safety of the treated potable water supply. It also brought up the inspections issue and the risk management side. Who was going to inspect and keep track of all the point sources in town that were considered high risk for cross connections?

In the end, Joe learned the ecosystem of regulations is integrated and very closely interrelated, especially in the water sector. Drastic changes must be thought out and supported by other regulations so there are no gaps in regulations and no unintended or designed softness in the regime of safety. Standards, codes, regulations, and guidelines must be aligned to support these overarching objectives. It is a true and balanced system full of interconnected supporting pillars holding up the basic objectives of protections for health, safety, infrastructure, economics, and in this case, the environment.

Key regulatory objectives cannot be changed at the drop of a hat without impacting others.

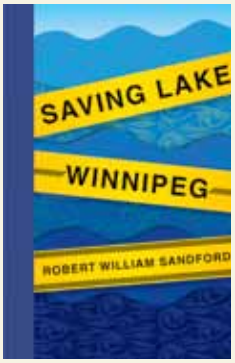
In the end, he discarded the planned proposal bylaw, but is now part of the codes and standards system attempting to develop the correct models so that one day he can achieve his dream in a safe and sustainable manner. He is doing this with the national thought leaders from across Canada within the system. There will be no surprises when his city eventually comes out with a proposed bylaw.

## Lessons learned

The consensus-based system of national standards development is critical to the foundation of Canada's regulatory system. It has been developed and refined to include a clear matrix of government, industry, and consumer stakeholders to ensure diverse viewpoints, opinions, and concerns are heard and addressed early. This is one of the important cornerstones of the system.

Key regulatory objectives cannot be changed at the drop of a hat without impacting others. They are all interrelated and must work in harmony for the system to work. The objectives in our building code system are supported and impacted by other regulations in other agencies, including health, environment, infrastructure, and energy—each with their own individual stresses to conserve that resource. Therefore, individual jurisdictions can't change one policy without affecting another or the system as a whole. And in the water sector, that boils down to the federal objective of assuring clean and safe drinking water to each and every Canadian via our multi-barrier approach. WC

Kevin Wong is the executive director of the Canadian Water Quality Association.




# Win A Book:
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In 2013, Lake Winnipeg was afforded international notoriety when the Global Nature Fund labeled it "Threatened Lake of the Year." The toxin produced by rampant algae blooms on Lake Winnipeg is now being detected in water bodies across Canada. In his book Saving Lake Winnipeg, water analyst Robert Sandford explains how the deterioration of the nation's lakes is a threat to not only human health, but to agricultural production and North America's economy at large. The book outlines how change is needed at all levels of government, industry, and society to help reverse this troubling trend.

## What can we do to save our lakes?

Email your answer to **rachel@watercanada.net** and you'll be entered to win a copy of Saving Lake Winnipeg.



## APPOINTED


Melanie Debassige

The Ontario Clean Water Agency (OCWA) has appointed **Melanie Debassige**, general manager of the Serpent River First Nation Economic Development Corporation, to its board. The appointment makes her the first Aboriginal woman to sit on the board of any Ontario Crown agency.


Scott King

Canadian **Scott King** of AMEC Environment and Infrastructure has been named a national director on the United States' National Ground Water Association board. He joins nine new officers and two national directors from across the United States.


John Stager

The Walkerton Clean Water Centre has appointed **John Stager** as the new chair of its board of directors. Stager brings more than 30 years of environmental management and organizational transformation experience to the board.


Ben Almond

CH2M HILL has named **Ben Almond** the incoming Canadian regional water manager.


Greg Willis

**Greg Willis** has been named vice-president of sales and marketing for NeoLogic Solutions.

Former Ontario Water Works Association (OWWA) president **Tom Moulton** has been elected vice-president of the American Water Works Association (AWWA). Former OWWA committee member **Pete Samson** will join him at AWWA as service provider director-at-large.

BluMetric Environmental Inc. has appointed **Jane Pagel** as a new independent director of the company. Pagel was most recently president and CEO of the Ontario Clean Water Agency (OCWA) from 2010 until early 2014.

The Capital Regional District (CRD) board, which will administer the implementation of the Core Area Wastewater Treatment program in Victoria, has announced the re-appointment of three Seaterra Commission members for two-year terms: **Fred Cummings**, president and general manager of the British Columbia Rapid Transit Company; **Ivan Ing**, president and special advisor at Rocklynn Capital; and **Hew McConnell**, president of Consensus Infrastructure Solution.

**Emmanuel Moya** has been named vice-president of technology at NanoStruck Technologies.

Send your news and events to **rachel@watercanada.net**

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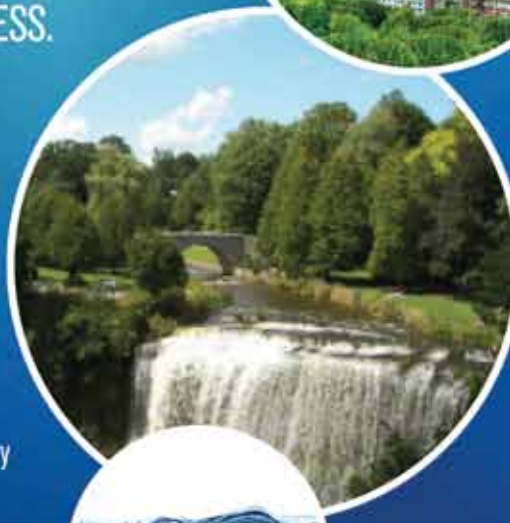

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- Water Management in Niagara Wine Country

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- Over 150 presentations

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- Annual Ice Breaker Reception
- Gala and Award Dinner

### Opening Keynote Speaker Ralph Pentland

A Canadian Water Policy Expert. Ralph was also the primary author of the 1987 Federal Water Policy. He has served as an environmental and water policy consultant in many countries, including the United States, Venezuela, Poland, Indonesia, India and China. Most recently he has co-authored the book entitled *Down the Drain: How We are Failing to Protect Our Water Resources.*

REGISTER NOW

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## CELEBRATED

The **Credit Valley Conservation** (CVC) was recognized with a Project of the Year Award at the Ontario Public Works Association (OPWA) Annual Conference and Awards ceremony. The award recognized the stormwater management retrofit at Elm Drive in Mississauga, a partnership between CVC, the City of Mississauga, and Peel District School Board. The project manages stormwater runoff with permeable pavement and a series of connected rain gardens.

Conservationist **Jamie Ross** was awarded the Kawartha Conservation 2014 Individual Conservationist Award for his decades of work on a range of projects on Lake Scugog, Ontario.

John Jackson

Canadian Environmental Law Association board member **John Jackson** was awarded the Buzz Besadny Award for fostering Great Lakes partnerships by the Great Lakes Fishery Commission.

## CONTRACTS

Quebec's **H2O Innovation Inc.** was awarded a $10-million contract to design, build, and supply major equipment and services for a seawater reverse osmosis (SWRO) system for the Monterey Peninsula Water Supply Project in California. Once completed, it will be the second largest SWRO system in the United States.

## HIRED

Kirk Wong

The Water Research and Innovation Network (WRAIN) has hired **Kirk Wong** as its new project manager.

## PARTNERED

Burlington, Ontario's **Anaergia Inc.**'s FibrePlate hybrid-membrane technology has been selected by California's Victor Valley Wastewater Reclamation Authority (VVWRA), an organization that specializes in converting wastewater into a useable resource, for two upcoming membrane bioreactor facilities.

## INVESTED

Vancouver's Axine Water Technologies closed a $5.6 million Series A financing round, which included the addition of new California-based investor, The Roda Group.

American Water Works Association

# ACE14

ANNUAL CONFERENCE & EXPOSITION

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# WATER

## Registration opens mid-November 2013.

ACE14 presents solutions to water utility challenges and offers more than 30 new and emerging topics to address and support utility needs. The four-day professional program will provide comprehensive support for drinking water and combined utilities under these subject areas:

- Communicating the Value of Water
- Regulatory Compliance
- Water Reclamation and Reuse
- Stormwater
- Utility Management and Finances
- Wastewater
- Water Quality and Treatment
- Water Resources and Planning
- Capital Project Delivery
- Desalination
- Emergency Preparedness
- Infrastructure Replacement and Renewal
- Sustainable Infrastructure
- Plus More!

**Boston, Massachusetts | June 8–12, 2014 | www.awwa.org/ace14**

Credit: Jennifer Swift

Tim Kulchyski, Cowichan Tribes biologist and member of the Cowichan Watershed Board

# **Watersheds 2014** Duncan, BC

From January 27 to 29, water issues in British Columbia were put on centre stage as watershed groups, researchers, professional resource managers, and decision makers at all levels of government, including First Nations, came together to re-envision the way we use, share, and respect our natural resources. More than 200 people—including online viewers from across the country—gathered at the Quw'utsun' Cultural and Conference Centre in Duncan, British Columbia for a national forum on capacity for freshwater protection, with a focus on watershed governance.

The three-day event, Watersheds 2014: Towards Watershed Governance in British Columbia and Beyond, was co-organized by the POLIS Water Sustainability Project, the University of Victoria's Department of Geography, and Brock University's Environmental Sustainability Research Centre, along with numerous partners from across the country. It was designed to support skills development and capacity building. It featured leading national and international speakers, and presented a unique opportunity to explore critical and emerging issues related to watershed governance, such as community-based monitoring, public engagement, legal tools, sustainable financing, and shared decision-making.

Coming out of the forum, the message was loud and clear: local communities and First Nations want to see their knowledge and interests reflected in decisions that affect their local watersheds. They are ready to be leaders in freshwater stewardship to make positive change in their watersheds.

# WATERtech 2014

## Register now!

Building on the enormous success of the first six Water Technologies Symposiums, the Environmental Services Association of Alberta (ESAA) is pleased to announce **WATERtech 2014** - the 7th annual Water Technologies Symposium. WATERtech 2014 will be the premier water technology transfer event for environmental professionals.

### Interested in Sponsorships?

A number of sponsorship opportunities are available for the Symposium. For more information contact Lorrine Hamdon via e-mail at: lorrine@esaa-events.com.

### Symposium organized by

Environmental Services Association of Alberta (ESAA)
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Edmonton, AB T6X 0A9
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web: www.esaa.org
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## April 9-11, 2014, Fairmont Banff Springs

**WATERtech 2014** will feature:

- 50 Technical Presentations covering Groundwater; Regulatory - Industry Perspectives; Technology, Imaging, Prevention and Alternatives; Water Usage/Conservation; Wastewater Treatment; Oil and Gas, and much more
- 3 Keynote Presentations
- Regulatory Update Session
- Numerous Networking Opportunities

In addition, ESAA is presenting sessions on Flood Management, Forecasting, Recovery and Monitoring; Oilsands Water Issues; and Pipeline Safety and Spill Response.

### WATERtech 2013 delegates raved:

"Overall, outstanding program delivery!"
"Keep doing what you're doing. That was the best conference I've been to."
"As usual a terrific job. Not sure how to improve upon perfection!!"
"Excellent, can't wait till next year."
"Great event and super networking. Facility was perfect."
"One of the best events I ever attended."

## For full details or to register go to:

**www.esaa-events.com/watertech**

The Fairmont Banff Springs

ENVIRONMENTAL SERVICES ASSOCIATION OF ALBERTA
ESAA


Ontario Premier Kathleen Wynne

Credit: Assembly of First Nations

## The National First Nations Infrastructure Conference & Tradeshow Toronto, ON

The Assembly of First Nations welcomed 552 guests to its inaugural National First Nations Infrastructure Conference & Tradeshow in Toronto from February 3 to 5. The event, which revolved around the theme, "Building for a Sustainable Future," focused on infrastructure innovations in First Nations communities. Three of the most discussed topics of the event were private-public partnerships (P3), the First Nations housing crisis, and the development of sustainable solutions for treating water and wastewater. There was also an emphasis on the importance of collaboration.

"The safety and health of our First Nations people must be a primary concern. How can we work together in partnership to create sustainable solutions?" said Regional Chief, Bill Traverse, the AFN Housing and Infrastructure Portfolio Holder.

National Chief Shawn A-in-chut Atleo added, "We can do better in housing, infrastructure, emergency management, and water. […] But we need collaboration on anything that affects our people. We must have a say."

Among the many presenters over the three days, Ontario Premier Kathleen Wynne delivered a speech on the importance of infrastructure as "the foundation of a strong, prosperous community. People need to have access to infrastructure that will keep them healthy. […] My goal in Ontario is that everyone is set for success no matter where you live."



## Go Beyond the Spreadsheet Lunch & Learn Toronto, ON

On February 18, WatrHub and WaterTAP welcomed professionals from across the water industry to the main theatre of the Ontario Investment and Trade Centre for Go Beyond the Spreadsheet: A Lunch & Learn on Data & Analytics for the Water Technology Sector.

Peter Gallant, VP of business development and regulatory affairs at ENDETEC, was the keynote speaker. He was joined by presenters from MaRS Data Catalyst, Google, WatrHub, and the Ontario Clean Water Agency (OCWA). The event highlighted the potential of big data and analytics as useful tools for water utilities and private enterprises.

Gallant started the session by providing some detailed real-life examples of how data is collected and what that data can tell us.

"What has happened in the last couple years in the water industry is that innovation in micromachine sensors, solid state technology, and communication technologies have allowed for the development of very inexpensive sensors that can be tapped in to a pipe like a service connection," Gallant said. "They're activated by a cell phone, and they communicate through SMS messaging. They measure multiple parameters: chlorine, turbidity, conductivity, flow rate. You can install large networks of these sensors relatively inexpensively, and now you've got large volumes of raw data which need analytics to process."

L-R: Ahmed Badruddin, CEO, WatrHub Inc. and Mohammad Qureshi, VP of Information Technology, Ontario Clean Water Agency

Credit: Daniel Royer

In the panels following the keynote presentation, MaRS Data Catalyst's Joe Greenwood and Google's Sylvia Ng described some of their experiences with big data outside of the water sector, while Gallant, Ahmed Badruddin of WatrHub, and Mohammad Qureshi of OCWA discussed the use of big data and analytics in the water industry.

Credit: KEITI

GPS and KEITI site visit to the EnbioCons Co. Ltd. sludge management facility at the Sudokwon Landfill Site in Incheon, South Korea.

## Canada-Korea ETV Program Co-verification Project

### Incheon, South Korea

GLOBE Performance Solutions (GPS) is the designated delivery agent of the Canadian Environmental Technology Verification (ETV) Program on behalf of Environment Canada. GPS and its Korean counterpart, the Korea Environmental Industry Technology Institute (KEITI), are working together on a cooperative project to verify an innovative sludge drying technology developed by leading Korean technology company, EnbioCons Co. Ltd.

On February 6, as part of this "co-verification" project, a site visit to one of the EnbioCons sludge management facilities took place at the Sudokwon Landfill Site in Incheon, South Korea. The Sudokwon Landfill Site is the largest sanitary landfill site in the world. The EnbioCons facility at Sudokwon is an impressive 1,000-tonnes/day sludge recycling operation.

John Neate, president of GPS, visited the EnbioCons facility with Won-Gee Kim of KEITI. Korea Testing Laboratory (KTL), an independent company that conducts performance testing, was also present. Following the site tour, GPS, KEITI, and KTL met with EnbioCons to discuss the ETV performance testing and verification process. It is expected that the final verification report and a performance verification statement for the EnbioCons technology will be completed by April 2014.

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The Walkerton Clean Water Centre is an agency of the Government of Ontario, established in 2004. WCWC's headquarters in Walkerton are LEED Gold certified and are well-equipped to meet the hands-on training, research and technology demonstration needs of Ontario's drinking water sector. More than 43,000 have participated in WCWC training across the province to date.

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# Basic Education Will Go a Long Way During Times of Crisis

BY CHRIS FRASER

Credit: Roozbeh Rokni

A total of 600,000 Ontario hydro customers were without electricity after a severe ice storm struck the central and eastern portions of Canada from December 20 to 23, 2013.

**IF ONLY** I could have been more than just a normal citizen of Toronto during the catastrophic ice storm that wiped out power for 600,000 Ontario customers over the holidays. I regret not being able to contribute good ideas to the post-mortem evaluation on how Toronto's city council, emergency teams, and Toronto Hydro responded to this crisis.

We know that extreme weather events like this will happen again. And I believe the City of Toronto must invest in more rigorous and robust emergency planning systems to make the city "catastrophe ready"—especially if we also include the record-breaking summer flood that affected 300,000 hydro customers.

Mayor Rob Ford and Toronto Hydro CEO Anthony Haines took centre stage during the holiday's "12 days of outages," but I believe the talented Lou Di Geronimo of Toronto Water should have also been invited to play a more prominent role. Why didn't we have someone advising Torontonians on how to reduce the potentially devastating impacts of frozen and broken pipes? How many everyday citizens know to turn on their taps to prevent pipes from freezing? How many know where to find the water shut-off valve?

I have to admit I didn't know where my shut-off valve was—and being in the midst of an ice storm is probably one of the worst times to learn. When I was talking to the plumber who helped restore my HVAC system during the storm, he said, "You'd be surprised by how few homeowners know where their shut off valve is." My plumber then told me that his dream is for "all new homes to be built with shut-off valves in the same place," so that when catastrophe hits, the aftermath can be minimized.

The ice storm should give Toronto Water the incentive to start a consumer education program about best practices on how to manage our water systems when the heat goes off—or, at the very least, on where the water shut-off valve is. With a little education and emergency preparedness, maybe Davies Consulting—the firm hired to audit Toronto Hydro's post-storm response—will have a little less work to do on their next audit when the power goes out. WC

Chris Fraser is the chief finder at Moveable.

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